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U.S. ENVIRONMENTAL PROTECTION AGENCY

Office of Radiation Programs

INTERNATIONAL NUMERICAL MULTIPLE AND SUBMULTIPLE PREFIXES

Multiples and submultiples	Prefixes	Symbols	Pronunciations
10^{12}	tera	T	tĕr'a
10^{9}	giga	G	jĭ'ga
10^{6}	mega	M	mĕg'a
10^{3}	kilo	k	kĭ'lo
10^{2}	hecto	h	hĕk'to
10	deka	da	dĕk'a
10^{-1}	deci	d	dĕs'i
10^{-2}	centi	c	sĕn'ti
10^{-3}	milli	m	mĭl'i
10^{-6}	micro	μ	mī'kro
10^{-9}	nano	n	năn'o
10^{-12}	pico	p	pē'ko
10^{-15}	femto	f	fĕm'to
10^{-18}	atto	a	ăt'to

SYMBOLS, UNITS, AND EQUIVALENTS

Symbol	Unit	Equivalent
Å	angstrom	10^{-10} meter
a	annum, year	
BeV	billion electron volts	GeV
Ci	curie	3.7×10^{10} dps
cm	centimeter(s)	0.394 inch
cpm	counts per minute	
dpm	disintegrations per minute	
dps	disintegrations per second	
eV	electron volt	1.6×10^{-12} ergs
g	gram(s)	
GeV	giga electron volts	1.6×10^{-3} ergs
kg	kilogram(s)	1,000 g = 2.205 lb.
km^2	square kilometer(s)	
kVp	kilovolt peak	
m^3	cubic meter(s)	
mA	milliampere(s)	
mCi/mi^2	millicuries per square mile	0.386 nCi/m^2 (mCi/km^2)
MeV	million (mega) electron volts	1.6×10^{-6} ergs
mg	milligram(s)	
mi^2	square mile(s)	
ml	milliliter(s)	
mm	millimeter(s)	
nCi/m^3	nanocuries per square meter	2.59 mCi/mi^2
pCi	picocurie(s)	10^{-12} curie = 2.22 dpm
R	roentgen	
rad	unit of absorbed radiation dose	100 ergs/g

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RADIATION DATA AND REPORTS

Volume 14, Number 3, March 1973

Radiation Data and Reports, a monthly publication of the Environmental Protection Agency presents data and reports provided by Federal, State, and foreign governmental agencies, and other cooperating organizations. Pertinent original data and interpretive manuscripts are invited from investigators.

In August 1959, the President directed the Secretary of Health, Education, and Welfare to intensify Departmental activities in the field of radiological health. The Department was assigned responsibility within the Executive Branch for the collation, analysis, and interpretation of data on environmental radiation levels. This responsibility was delegated to the Bureau of Radiological Health, Public Health Service. Pursuant to the Reorganization Plan No. 3 of 1970, effective December 2, 1970, this responsibility was transferred to the Radiation Office of the Environmental Protection Agency which was established by this reorganization.

The Federal agencies listed below appoint their representatives to a Board of Editorial Advisors. Members of the Board advise on general publications policy; secure appropriate data and manuscripts from their agencies; and review those contents which relate to the special functions of their agencies.

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Published under the direction of

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U.S. ENVIRONMENTAL PROTECTION AGENCY

William D. Ruckelshaus, Administrator

Reports

Radiobioassay Program of the Institutional Total Diet Sampling Network: I. Analytical Data Related to Samples Collected During 1966–1968

A. A. Moghissi,[1] M. W. Carter,[2] and R. Lieberman[3]

In January 1966, a radiobioassay program was added to the Institutional Total Diet Sampling Network program. The sampling and analysis procedures are described and the data for 1966 through 1968 are presented.

There have been numerous measurements related to environmental radiation and the contribution of internally deposited radionuclides to the radiation dose in people. In recognition of the potential significance of the diet as a source of intake of radionuclides, the Institutional Total Diet Sampling Network program (ITDSN) was initiated in 1961 by certain components of the U.S. Public Health Service, which now reside in the Office of Radiation Programs, U.S. Environmental Protection Agency. The details of the program have been described by Anderson and Nelson (*1*) and the results have been published periodically in this journal.

The ITDSN assesses the radionuclide content of food consumed by certain groups of children from 6 to 18 years of age. Initially, eight institutions were selected. As experience was gained, its scope was increased to boarding schools and children's homes in 50 locations. As of July 1965, 21 basic institutions and eight auxiliary institutions were sampled. The selection of sampling sites was based on the coverage of different economic and social segments of the population.

In January 1966, the ITDSN was supplemented by a radiobioassay program covering 10 institutions of the ITDSN (figure 1). The objective of the radiobioassay program was to provide an assessment of environmental radiation dose from certain internally deposited radionuclides from excretion data. Certain results from this program related to cesium-137 (*2*) and tritium (*3*) have been published previously.

In a series of papers, the results of the first 3 years of the radiobioassay program are reported. This paper also deals with the details of sampling and analysis not previously reported, analytical results, and certain conclusions. Other reports deal with selected physiological constants of urine (*4*), and certain findings relating to cesium-137 (*5*) and strontium-90 (*6*).

Procedures

The details of sampling and analysis of food samples of the ITDSN have been described repeatedly in *Radiation Data and Reports*. The sampling procedure was identical at each station. Each sample consisted of an edible portion of the diet for a full 7-day week. All intake was included except drinking water, which was sampled periodically. Subsequently, food samples were frozen and mailed to appropriate laboratories for analysis.

The sampling procedure for urine was as follows: once each month, two children from each station were asked to collect a 24-hour urine sample starting with the morning voiding. One-gallon disposable polyethylene con-

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Table 1. Radiobioassay results, food and urine, ITDSN, Wilmington, Del., 1966–1968

ID	Age	Sex	Date	Urine								Food			Urine			Food		
				Creatinine (g/day)	pH	Specific gravity	Osmolality (mOs/kg)	Volume (ml)	Cesium-137 (pCi/liter)	Cesium-137 (pCi/day)	$^{137}Cs/K$ (pCi/g)	Cesium-137 (pCi/kg)	Cesium-137 (pCi/day)	$^{137}Cs/K$ (pCi/g)	Strontium-90 (pCi/liter)	Strontium-90 (pCi/day)	$^{90}Sr/Ca$ (pCi/g)	Strontium-90 (pCi/kg)	Strontium-90 (pCi/day)	$^{90}Sr/Ca$ (pCi/g)
1966																				
71	12	M	Jan	[b] 0.280	6.7	1.016		705	33	23	36	35	70	21	3	1.8	27	11	22	16
72	12	M		.825	5.7	1.030		875	47	41	13	35	70	21	4	3.6	72	11	22	16
88	12	M	Feb	.800	6.6	1.026		740	46	34	12	40	70	24	4	2.7	39	10	18	13
89	10	M		.760	6.6	1.025		1,120	37	42	16	40	70	24	7	7.4	[b] 148	10	18	13
105	12	M	Mar	.860	6.4	1.023		780	68	53	18	40	85	24	3	2.5	36	11	24	16
106	9	M		.914	5.7	1.027		700	60	42	19	40	85	24	6	4.5	32	11	24	16
142	12	M	Apr	.947	5.9	1.024		740	41	30	27	25	55	16	3	2.0	18	9	19	15
143	12	M		.717	6.1	1.018		1,120	43	48	21	25	55	16	2	2.2	37	9	19	15
171	12	M	May	.860	6.1	1.025		660	62	41	20	25	50	17	3	2.0	22	10	20	14
172	10	M		.759	6.3	1.026		940	49	46	16	25	50	17	5	4.9	41	10	20	14
211	11	M	June	.885	6.5	1.018		1,140	22	25	13	25	50	15	5	5.4	42	11	22	16
212	12	M		1.000	5.8	1.017		1,200	13	16	12	25	50	15	4	4.9	26	11	22	16
235	12	M	July	1.020	5.6	1.026		960	43	41	21		58		5	4.5	45			
236	11	M		1.000	5.6	1.027		830	57	47	18		58		2	1.3	11			
254	10	M	Aug	.770	6.0	1.020		800	35	28	10	25	50	15	5	4.3	43	10	20	14
255	12	M		1.460	6.2	1.022		1,280	48	61	19	25	50	15	3	4.2	22	10	20	14
283	10	M	Sept	.902	6.4	1.020		960	25	24	9	25	50	14	5	4.7	28	10	20	14
284	12	M	Oct	1.095	6.6	1.023		830	37	31	9	25	55	15	5	3.9	43	10	21	16
349	10	M	Nov			1.015		1,040	26	27	14	25	50	15				11	21	14
350	11	M	Dec			1.020		1,020	22	22	8	25	50	17				8	16	11
1967																				
384	12	M	Jan	1.09	5.0	1.016		1,580	11	17	6	15	35	9	3	5.1	23	10	22	15
385	11	M		1.50	5.0	1.022		1,580	23	36	9	15	35	9	2	3.3	15	10	22	15
394	12	M	Feb	.83	5.6	1.016		1,220	18	22	7	25	55	14	1	1.0	7	9	20	13
395	11	M		1.25	5.4	1.024		1,560	23	36	11	25	55	14	1	1.8	9	9	20	13
411	11	M	Mar	1.10	5.2	1.020		1,100	37	41	18	20	40	10	1	1.2	7	10	21	15
412	12	M		.76	4.5	1.015		1,180	16	19	12	20	40	10	2	1.9	17	10	21	15
463	12	M	Apr	.87	5.5	1.015	515	1,180	<10	< 7		10	20	5	2	1.8	18	9	20	13
464	12	M		1.44	6.0	1.020	631	1,640	14	23	6	10	20	5	3	4.3	16	9	20	13
475	11	M	May	.47	6.3	1.010	318	1,300	25	33	17	15	30	8	2	2.2	33	8	17	11
476	12	M		1.53	6.0	1.025	910	1,500	47	71	15	15	30	8	4	5.6	16	8	17	11
507	11	M	June	.57	5.8	1.010	423	1,420	21	30	17	30	70	18	2	3.5	29	12	28	15
508	12	M		.61	6.1	1.018	790	800	32	26	19	30	70	18	5	3.6	33	12	28	15
509	12	M	July	1.37	5.8	1.015	594	1,820	15	27	14	17	40	9	2	3.8	6	16	14	7
510	11	M		.47	6.5	1.005	275	1,340	<10	<11		17	40	9	2	2.2	25	16	14	7
531	11	M	Aug	[a] 2.28	5.7	1.010	527	1,520	39	59	28	14	31	8	2	2.7	20	9	20	13
532	12	M		[a] 2.25	5.9	1.011	456	2,082	26	54	18	14	31	8	1	2.8	5	9	20	13
553	10	M	Sept	.65	6.3	1.015	663	1,160	27	31	10	0	0	0	[b] 14	15.7	127	10	21	14
554	11	M		.73	6.1	1.024	1,550	630	20	13	26	0	0	0	8	5.1	35	10	21	14
564	11	M	Oct	.78	6.1	1.012	535	1,030	14	14	8	0	0	0	2	1.8	20	10	21	13
583	10	M	Nov	[a] 2.76	6.9	1.013	581	1,105	10	10		12	27	8	1	1.4	8	8	18	12
584	11	M		1.43		1.025	1,200	550	16	9	9	12	27	8	3	1.7	13	8	18	12
596	11	M	Dec	.96	6.0	1.035	3,100	740	15	11	5	14	29	9	2	1.4	9	7	15	11
597	10	M		.41	6.5	1.020	468	1,020	<10	< 8		14	29	9	1	1.1	11	7	15	11

| | | |

Table 2. Radiobioassay results, food and urine, ITDSN, Tampa, Fla., 1966–1968

ID	Age	Sex	Date	Urine								Food			Urine			Food		
				Creatinine (g/day)	pH	Specific gravity	Osmolality (mOs/kg)	Volume (ml)	Cesium-137 (pCi/liter)	Cesium-137 (pCi/day)	$^{137}Cs/K$ (pCi/g)	Cesium-137 (pCi/kg)	Cesium-137 (pCi/day)	$^{137}Cs/K$ (pCi/g)	Strontium-90 (pCi/liter)	Strontium-90 (pCi/day)	$^{90}Sr/Ca$ (pCi/g)	Strontium-90 (pCi/kg)	Strontium-90 (pCi/day)	$^{90}Sr/Ca$ (pCi/g)
1966																				
55	12	M	Jan	1.480	6.1	1.022		1,400	149	208	57	70	150	50	4	5.4	36	9	19	13
56	12	M		[a] 1.830	6.4	1.020		1,900	110	210	58	70	150	50	5	8.8	50	9	19	13
73	12	M	Feb	[b] .218	6.2	1.009		[b] 280	107	30	47	45	90	27	7	2.0	80	14	29	16
74	9	M		.574	6.1	1.028		700	134	94	55	45	90	27	5	3.8	40	14	29	16
107	13	F	Mar	.317	6.7	1.018		440	95	42	36	60	120	40	3	1.4	23	10	20	14
108	10	F		.490	6.4	1.020		500	130	65	40	60	120	40	7	3.5	70	10	20	14
113	12	F	Apr	.470	6.8	1.009		1,960	25	49	26	85	165	50	1	2.3	15	11	21	12
114	12	F		.678	6.8	1.020		640	105	67	34	85	165	50	4	2.6	37	11	21	12
169	9	M	May	[b] .319	6.4	1.025		440	132	58	107	55	85	43	8	3.5	13	9	14	16
170	12	M		[b] .085	7.0	1.017		[b] 150	280	42	300	55	85	43	12	1.8	38	9	14	16
201	6	M	June	.548	5.5	1.026		600	117	70	52	80	130	50	7	4.4	36	12	20	20
202	8	M		.538	6.4	1.026		480	90	43	36	80	130	50				12	20	20
223	9	M	July	.960	5.6	1.026		800	164	131	66	55	95	37	2	1.9	11	8	14	16
224	10	M		.851	6.1	1.012		1,820	53	97	67	55	95	37	1	2.7	40	8	14	16
229	9	M	Aug	[b] .300	6.0	1.027		340	194	66	102	75	170	47	3	1.0	20	12	27	19
230	8	M		.670	6.1	1.018		800	105	84	57	75	170	47	2	1.2	33	12	27	19
276	12	M	Sept	.435	6.3	1.012		435	78	34	110	80	170	47				14	29	22
277	10	F		[b] .320	6.9	1.020		430	98	42	47	80	170	47				14	29	22
242	10	F		.670	5.8	1.017		1,300	65	84	57	80	170	47	2	3.0	16	14	29	22
243	10	F		.866	6.5	1.026		620	98	61	30	80	170	47	4	2.2	29	14	29	22
287	10	F	Oct	.519	6.3	1.024		440	77	34	23	105	235	69	7	3.0	58	10	22	16
288	10	F		.755	6.4	1.014		1,020	69	70	43	105	235	69	2	2.3	12	10	22	16
296	9	M		.666	6.8	1.022		660	176	116	53	105	235	69	5	3.0	30	10	22	16
297	8	M	Nov	[b] .360	6.6	1.020		450	131	59	59	45	95	28	4	1.6	26	10	21	19
363	10	F	Dec			1.005		980	57	56	37	50	100	27				10	20	17
364	10	F				1.016		390	82	32	31	50	100	27				10	20	17
1967																				
372	10	F	Jan	.57	5.8	1.017		880	26	23	18	35	75	20	1	1.1	8	9	20	15
373	11	F	Feb	.42	5.8	1.016		700	34	24	32	35	75	22	2	1.4	14	6	13	10
429	11	F	Mar	.94	5.5	1.011		1,180	31	37	21	40	85	21	.5	.4	15	8	17	14
430	10	F		1.22	6.0	1.022		1,020	70	71	21	40	85	21	.2	.2	2	8	17	14
471	9	M	Apr	.74	6.4	1.020	779	900	64	58	25	35	70	20	3	2.6	50	7	14	14
472	12	M		.56	6.4	1.028	1,035	600	49	29	24	35	70	20	3	2.0	75	7	14	14
479	11	F	May	.45	5.8	1.032	1,195	[b] 250	16	4	29	40	85	23	4	.9	80	8	17	17
480	9	M		.39	6.2	1.020	790	[b] 300	12	4	17	40	85	23	3	.9	150	8	17	17
497	11	F	June	.71	6.6	1.022	812	790	71	56	30	50	100	20	3	2.0	30	7	14	12
498	11	F		.76	6.1	1.026	1,500	760	49	37	21	50	100	20	[c] 9	6.6	112	7	14	12
513	12	F	July	.82	6.7	1.020	705	630	39	25	25	61	118	32	2	1.0	100	5	10	9
514	11	F		.65	6.1	1.028	2,000	540	45	24	29	61	118	32	1	.8	6	5	10	9
529	9	M	Aug	1.11	5.9	1.020	595	640	45	29	48	43	89	24	1	.3	13	7	15	12
530	10	M		1.05	6.1	1.024	609	720	40	29	33	43	89	24				7	15	12
543	12	F	Sept	.49	5.4	1.020	670	390	25	10	37	55	115	30	1	.3	50	9	19	16
544		F		.52	6.3	1.030	1,550	360	21	8	18	55	115	30	5	1.8	31	9	19	16
558	10	M	Oct	.43	6.0	1.021	704	655	34	22	63	29	61	18	1	.5	6	6	12	9
559	7	M		[b] .24	5.7	1.015	613	455	< 10	< 4		29	61	18	1	.3	17	6	12	9
579	9	F	Nov	1.06	6.5	1.014	522	1,760	66	116	32	44	92	24	2	3.3	20	4	9	8
580	11	F		.52	6.4	1.027	909	550	39	21	27	44	92	24	3	1.6	21	4	9	8
598	7	M	Dec	.55	6.7	1.033	1,250	790	84	66	40	54	116	29	1	.7	17	6	12	9
599	8	M		.54	6.5	1.034	824	900	84	76	62	54	116	29	1	1.1	8	6	12	9

| | | | | 1968 | | | |

Table 3. Radiobioassay results, food and urine, ITDSN, Idaho Falls, Idaho, 1966–1968

ID	Age	Sex	Date	Urine								Food			Urine			Food		
				Creatinine (g/day)	pH	Specific gravity	Osmolality (mOs/kg)	Volume (ml)	Cesium-137		$^{137}Cs/K$ (pCi/g)	Cesium-137		$^{137}Cs/K$ (pCi/g)	Strontium-90		$^{90}Sr/Ca$ (pCi/g)	Strontium-90		$^{90}Sr/Ca$ (pCi/g)
									(pCi/liter)	(pCi/day)		(pCi/kg)	(pCi/day)		(pCi/liter)	(pCi/day)		(pCi/kg)	(pCi/day)	
1966																				
67	17	M	Jan	0.680	6.5	1.027		410	100	41	30	45	85	34	2	0.7	10	9	7	11
68	17	M		[a] 1.700	5.6	1.026		1,060	56	59	24	45	85	34	3	3.1	29	9	17	11
79	16	M	Feb	.820	6.5	1.026		460	72	33	20	35	65	24	3	1.3	17	16	29	19
80	16	M		1.270	5.8	1.033		610	74	45	32	35	65	24	.5	.3	4	16	29	19
94	15	M	Mar	1.080	5.9	1.018		1,320	37	49	25	40	75	28	6	7.6	149	11	21	16
115	15	M	Apr	.583	6.3	1.019		620	34	21	18	30	55	20	3	1.6	24	8	14	12
119	17	M		.583	6.4	1.028		360	44	16	21	30	55	20	4	1.5	19	8	14	12
167	16	M	May	1.290	6.1	1.023		770	64	49	24	30	55	20	3	2.0	22	25	43	19
168	17	M		1.329	6.0	1.029		510	78	40	22	30	55	20	4	2.0	27	25	43	19
193	17	M	June	1.600	6.6	1.028		1,050	57	60	27	30	45	21				6	9	9
194	17	M		1.530	6.4	1.028		1,000	66	66	25	30	45	21				6	9	9
225	16	M	July	1.391	5.4	1.028		940	34	32	16	25	40	16	4	3.7	20	6	10	5
226	17	M		.938	6.4	1.027		920	34	31	19	25	40	16	4	3.3	16	6	10	5
239	16	M	Aug	1.390	5.9	1.023		770	38	29	17	35	80	25	2	1.2	29	9	21	12
258	16	M	Sept	1.600	5.9	1.020		1,380	42	58	17	30	70	17	2	3.0	23	9	21	11
259	17	M	Oct	.830	5.8	1.027		600	38	23	18	30	60	17	[b] 29	17.4	120	12	24	12
292	16	M	Nov	[a] 1.952	6.4	1.026		1,220	48	58	14	30	65	17	1	1.8	11	9	20	10
308	16	M	Dec	[a] 1.740	6.4	1.022		1,280	40	51	12	20	45	12	8	10.0	46	13	29	15
1967																				
380	17	M	Jan	0.91	6.0	1.030		660	40	26	14	30	65	17	2	1.1	14	11	24	11
381	18	M		1.56	4.8	1.030		920	49	45	17	30	65	17	3	2.3	43	11	24	11
386	16	M	Feb									25	45	13				11	19	16
387	17	M							41			25	45	13				11	19	16
435	17	M	Mar	1.30	6.8	1.020		1,080	28	30	9	10	20	5	1	1.3	14	8	17	9
436	18	M		1.53	6.2	1.023		900	36	32	12	10	20	5	1	1.1	7	8	17	9
469	17	M	Apr	[a] 1.86	6.5	1.025	1,005	1,500	33	50	11	10	20	5	18	27.6	120	8	17	10
470	17	M		1.64	6.4	1.025	875	1,300	26	34	13	10	20	5	11	14.2	58	8	17	10
485	17	M	May	1.30	5.0	1.025	1,044	940	< 10	7		20	35	11	2	1.8	13	7	13	5
486		M		1.04	5.4	1.030	1,203	700	14	10	6	20	35	11	1	1.0	20	7	13	5
511	17	M	June	[a] 1.80	6.3	1.020	864	1,640	38	62	17	15	25	9	3	4.8	18	2	1	1
512	16	M		1.11	6.6	1.025	927	1,060	16	17	6	15	25	9				2	1	1
525	16	M	July	[a] 2.11	5.7	1.021	726	1,200	30	36	15	12	22	7	1	1.5	8	6	11	4
526	17	M		[a] 2.33	5.5	1.016	884	800	29	23	12	12	22	7	2	1.6	18	6	11	4
541	15	M	Aug	[a] 3.69	5.3	1.025	938	1,500	16	24	5	26	53	13	1	1.9	5	14	30	12
542	15	M		[a] 3.13	6.1	1.029	979	1,150	38	44	13	26	53	13	1	.8	7	14	30	12
555	13	M	Sept	1.22	5.0	1.006	275	3,400	13	44	19	0	0	0	1	3.8	33	9	16	6
567	13	M		1.52	6.4	1.010	372	2,310	< 10	12		0	0	0	2	3.5	20	9	16	6
568	13	M	Oct	1.39	6.2	1.012	317	2,680	15	40	12	16	31	9	2	5.4	20	7	13	7
581	15	M		1.25	5.6	1.018	696	1,100	20	22	7	16	31	9	.2	.2	1	7	13	7
582	15	M	Nov	[a] 1.75	5.5	1.031	1,600	700	37	26	9	14	30	8	1	.7	33	7	15	7
585	14	M		[b] .37	5.6	1.011	453	1,840	16	29	9	14	30	8	3	5.0	43	7	15	7
586	14	M	Dec	[a] 2.75	6.1	1.011	328	2,220	16	36	11	13	28	8	2	4.0	100	7	16	6

1968

612	13	M	Jan	.83	6.3	1.020	711	960	35	34	25	12	27	7	2	1.9	31	13	30	10
613	13	M		.62	6.3	1.020	796	660	13	9	8	12	27	7	1	.7	19	13	30	10
617	15	M	Feb	[a] 2.11	5.5	1.035	2,500	1,120	38	43	10	0	0	0	1	.6	2	7	16	7
618	15	M		[a] 1.71	6.2	1.031	900	1,300	22	29	9	0	0	0	3	4.2	17	7	16	7
640	15	M	Mar	.87	7.1	1.030	976	760				18	34	13		<1.0		10	18	11
641	15	M		[a] 1.64	6.0	1.030	3,300	980				18	34	13		<1.0		10	18	11
653	16	M	Apr	[a] 1.64	5.1	1.023	832	1,220	<10	<5		13	28	9	2	3.0	10	12	26	9
654	16	M		[a] 2.19	5.5	1.030	1,600	1,080	22	24	5	13	28	9		<1.0		12	26	9
659	16	M	May	[a] 2.13	6.0	1.025	778	1,600	27	43	9	13	27	8	1	1.6	5	8	15	10
660	16	M		[a] 2.36	6.0	1.027	854	1,560	27	41	9	13	27	8		<1.0		8	15	10
676	17	M	June	1.22	5.9	1.013	455	2,580				19	40	12	1	2.8	11	8	18	10
677	17	M		.60	6.1	1.012	260	1,390				19	40	12	1	1.7	17	8	18	10
697	17	M	July	1.07	8.3	1.020	910	1,340	27	36	13	20	44	15	<1	.1		7	16	7
698	17	M		1.35	8.1	1.016	860	1,500	41	62	19	20	44	15	<1	2.4		7	16	7
714	16	M	Sept	[a] 1.71	6.3	1.020	820	1,840	33	61	8	13	23	8	2	4.1	12	10	18	8
715	16	M		[a] 2.26	6.0	1.016	640	1,760	28	49	9	13	23	8	3	4.7	10	10	18	8
727			Oct	.60	5.9	1.015	515	580	11	6	12	16	29	10	2	1.0	18	9	16	6
728				[b] .20	6.5	1.013	525	[b] 155				16	29	10				9	16	6
739	14	M	Nov	[a] 2.15	6.2	1.022	760	1,600	29	46	10	25	53	14	2	2.4	40	11	23	10
740	14	M		1.51	6.5	1.030	1,500	1,000	42	42	12	25	53	14	<1	>.1		11	23	10
754	17	M	Dec	[a] 2.14	5.9	1.019	555	2,000	11	22	8	23	46	13	2	4.0	17	8	16	6
755	17	M		[a] 2.28	5.6	1.012	500	2,350	18	42	14	23	46	13	1	3.3	8	8	16	6

[a] Values outside of the normal range, but included in evaluation.

[b] Values outside of the normal range, and excluded from further evaluation.

Table 4. Radiobioassay results, food and urine, ITDSN, Chicago, Ill., 1966–1968

ID	Age	Sex	Date	Urine								Food			Urine			Food		
				Creatinine (g/day)	pH	Specific gravity	Osmolality (mOs/kg)	Volume (ml)	Cesium-137		$^{137}Ca/K$ (pCi/g)	Cesium-137		$^{137}Ca/K$ (pCi/g)	Strontium-90		$^{90}Sr/Ca$ (pCi/g)	Strontium-90		$^{90}Sr/Ca$ (pCi/g)
									(pCi/liter)	(pCi/day)		(pCi/kg)	(pCi/day)		(pCi/liter)	(pCi/day)		(pCi/kg)	(pCi/day)	
1966																				
59	12	F	Jan	0.750	6.0	1.019		800	53	42	16	45	75	29	5	[b] 3.6	73	7	12	9
60	13	F		.645	5.9	1.018		660	42	28	20	45	75	29	6	[b] 3.8	78	7	12	9
75	11	M	Feb	.640	6.5	1.019		460	43	20	18	45	65	33	4	1.7	36	9	13	13
76	11	M		.740	6.5	1.017		440	68	30	22	45	65	33	2	1.0	29	9	13	13
92	13	F	Mar	1.100	5.6	1.028		660	86	57	26	40	70	28	8	[b] 5.6	98	9	15	11
93	13	F		.830	6.1	1.022		740	54	40	16	40	70	28	6	[b] 4.5	129	9	15	11
134	12	M	Apr	.713	6.6	1.027		810	33	27	24	35	50	25	3	2.3	35	8	11	11
128	12	M		.622	6.2	1.017		740	32	24	22	35	50	25	2	1.8	49	8	11	11
163	13	F	May	.860	6.0	1.017		1,240	46	57	31	40	60	27				8	12	11
164	13	F		1.254	6.4	1.017		1,340	42	56	21	40	60	27	3	3.6	33	8	12	11
187	13	F	June	1.496	6.2	1.029		730	68	50	27	30	50	22	3	2.0	15	12	20	18
188	12	F		.810	6.2	1.019		860	44	38	51	30	50	22	2	1.8	19	12	20	18
220	12	M	July	.828	5.8	1.023		600	28	17	11	20	30	15	4	2.2	19	6	9	9
221	12	M		.932	5.9	1.019		1,000	26	26	11	20	30	15	2	2.2	30	6	9	9
232	12	M	Aug	.895	6.1	1.025		710	83	59	34	15	20	10	4	2.7	33	6	8	8
233	12	M		.170	5.6	1.017		[b] 180	94	17	31	15	20	10	5	.9	11	6	8	8
252	13	F	Sept	.800	5.7	1.017		740	36	27	18	20	35	13	4	2.6	25	6	10	8
253	11	F		.770	5.9	1.024		520	37	19	13	20	35	13				6	10	8
294	12	M	Oct	.924		1.018		670	30	20	14	25	40	19	4	2.9	24	7	11	12
295	12	M		[b] .370		1.022		[b] 290	38	11	12	25	40	19	8	2.3	15	7	11	12
333	13	F	Nov			1.020		1,120	45	50	30	25	45	15				7	12	10
334	11	F				1.019		820	59	48	20	25	45	15				7	12	10
367	12	M	Dec			1.023		520	42	22	13	25	30	16				8	9	11
368	12	M				1.028		360	44	16	16	25	30	16				8	9	11

Table 4. Radiobioassay results, food and urine, ITDSN, Chicago, Ill., 1966–1968—continued

ID	Age	Sex	Date	Urine								Food			Urine			Food		
				Creatinine (g/day)	pH	Specific gravity	Osmolality (mOs/kg)	Volume (ml)	Cesium-137		$^{137}Cs/K$ (pCi/g)	Cesium-137		$^{137}Cs/K$ (pCi/g)	Strontium-90		$^{90}Sr/Ca$ (pCi/g)	Strontium-90		$^{90}Sr/Ca$ (pCi/g)
									(pCi/liter)	(pCi/day)		(pCi/kg)	(pCi/day)		pCi/liter)	(pCi/day)		(pCi/kg)	(pCi/day)	
1967																				
376	11	F	Jan	.92	5.4	1.016		1,080	29	31	19	15	25	10	1	.7	11	7	11	10
377	11	F		.88	5.7	1.023		820	26	21	11	15	25	10	1	1.1	20	7	11	10
398	12	M	Feb	.76	4.6	1.028		820	28	19	9	20	30	12	2	1.4	22	7	11	9
433	12	F	Mar	1.02	6.3	1.020		1,080	22	24	11	20	35	11	2	1.7	22	7	12	9
434	11	F		.77	6.2	1.023		820	37	30	15	20	35	11	1	.9	20	7	12	9
461	12	M	Apr	.76	5.5	1.021	839	880	17	15	7	10	15	6	1	.7	20	7	11	11
462	12	M		.67	5.6	1.025	935	500	16	8	20	10	15	6	2	.9	13	7	11	11
483	11	F	May	1.04	6.6	1.020	699	1,160	30	35	12	15	30	10	1	.9	33	8	16	10
484	12	F		1.06	6.2	1.025	846	1,520	15	23	8	15	30	10	2	2.9	17	8	16	10
499	12	F	June	.85	6.4	1.025	914	820	20	16	8	15	25	10	1	.9	20	8	13	12
500	11	F		1.34	5.8	1.020	844	1,340	20	27	12	15	25	10	1	1.7	11	8	13	12
517	12	M	July	.73	6.0	1.016	615	780	13	10	14	22	29	13	1	1.1	10	7	9	10
518	11	M		.73	5.8	1.020	800	960	18	17	13	22	29	13	1	1.1	17	7	9	10
527	12	F	Aug	[a]2.78	5.6	1.030	1,150	960	37	36	17	18	30	12	1	.8	10	8	13	11
528	12	F		.94	5.9	1.022	673	440	13	6	15	18	30	12	2	.9	100	8	13	11
556	12	F	Oct	1.02	5.3	1.024	968	850	33	28	22	11	18	7	1	.9	8	5	6	7
557	12	F		.83	5.6	1.024	781	755	24	18	20	11	18	7	1	.8	25	5	6	7
577		M	Nov	1.01	5.8	1.018	747	1,260	18	23	10	15	20	8	2	2.1	11	7	12	9
578		M		1.32	6.2	1.016	724	1,160	13	15	8	15	20	8	6	6.4	46	7	12	9
593	13	F	Dec	.90	6.2	1.020	791	1,000	14	14	6	24	35	14	3	2.8	150	7	10	10
594	12	F		1.26	6.5	1.021	796	1,000				24	35	14	1	.7	25	7	10	10
1968																				
606	10	M	Jan	1.20	5.8	1.025	911	920	29	27	13	18	29	11	3	2.4	52	6	10	8
607	11	M		.86	5.8	1.025	810	540	33	18	25	18	29	11	3	1.4	19	6	10	8
621	13	F	Feb	.97	5.7	1.027	926	480	18	9	16	15	23	10	4	2.1	27	7	10	9
622	13	F		1.53	5.8	1.029	1,600	880	22	19	9	15	23	10	6	5.5	36	7	10	9
635	12	M	Mar	.44	5.9	1.017	540	560				22	34	12		<1.0		6	9	6
636	11	M		.65	6.0	1.020	768	540	15	8	29	22	34	12		<1.0		6	9	6
651	12	F	Apr	1.31	6.1	1.020	738	1,190	<10	11		15	19	9		<1.0		7	9	9
652	12	F		1.11	6.3	1.022	770	800	<10	7		15	19	9		<1.0		7	9	9
661	12	M	May	.87	5.0	1.022	755	800	14	11	8	14	22	10	2	1.2	17	6	10	9
662	11	M	June	.89	6.2	1.035	1,500	420								<1.0				
699	15	F	July	.99	6.0	1.032	1,500	650				12	17	8	3	2.1	18	7	10	13
700	15	F	Aug	1.29	5.5	1.034	3,100	620		11	10				2	1.0	11	NS		

[a] Values outside of the normal range, but included in evaluation. [b] Values outside of the normal range, and excluded from further evaluation. NS, no sample.

Table 5. Radiobioassay results, food and urine, ITDSN, Louisville, Ky., 1966–1968

ID	Age	Sex	Date	Urine								Food			Urine			Food		
				Creatinine (g/day)	pH	Specific gravity	Osmolality (mOs/kg)	Volume (ml)	Cesium-137 (pCi/liter)	Cesium-137 (pCi/day)	$^{137}Cs/K$ (pCi/g)	Cesium-137 (pCi/kg)	Cesium-137 (pCi/day)	$^{137}Cs/K$ (pCi/g)	Strontium-90 (pCi/liter)	Strontium-90 (pCi/day)	$^{90}Sr/Ca$ (pCi/g)	Strontium-90 (pCi/kg)	Strontium-90 (pCi/day)	$^{90}Sr/Ca$ (pCi/g)
1966																				
63	11	M	Jan	0.433	5.2	1.020		460	24	11	9	25	35	14	7	3.0	61	12	16	15
64	11	M		.695	5.3	1.025		420	80	34	21	25	35	14	6	2.5	60	12	16	15
84	11	M	Feb	.740	5.8	1.023		710	39	28	16	25	35	17	5	3.8	21	16	22	16
85	12	M		.855	5.7	1.028		610	49	30	16	25	35	17	7	4.2	62	16	22	16
198	10	M	June	.503	6.1	1.017		730	34	25	22	30	40	17	3	2.0	11	19	25	19
199	10	M		[a] .330	6.5	1.017		470	30	14	12	30	40	17	4	2.0	40	19	25	19
256	14	M	Sept	[b] 2.030	5.9	1.018		1,920	30	58	15	15	25	8	1	2.3	13	13	23	18
257	14	M		1.190	5.7	1.022		780	37	29	13	15	25	8	1	1.0	20	13	23	18
289	14	M	Oct	1.220	6.5	1.016		1,300	30	39	13	15	20	10	4	4.7	50	8	12	13
290	14	M		[b] 1.810	6.3	1.025		880	30	26	11	15	20	10	4	3.8	75	8	12	13
342	14	M	Nov			1.020		700	44	31	15	20	35	12				11	20	13
343	14	M				1.016		1,480	22	33	12	20	35	12				11	20	13
357	12	M	Dec			1.014		1,500	<10	3		15	30	10				10	20	13
358	12	M				1.025		720	10	7	6	15	30	10				10	20	13
1967																				
374	13	M	Jan	[a] .28	4.9	1.025		[a] 230	<10			20	25	11	2	.5	1	9	11	12
375	12	M		[a] .30	5.4	1.023		[a] 330	<10			20	25	11	2	.5	1	9	11	12
399	12	M	Feb	[a] .16	5.2	1.026		[a] 120				15	25	9				10	18	13
400	12	M		.44	4.6	1.016		570	<10	5	11	15	25	9	1	.8	8	10	18	13
431	13	M	Mar	.48	8.8	1.017		800	13	10	15	15	25	9	1	1.0	20	12	20	17
432	12	M		[a] .29	6.4	1.025		[a] 260	10	3	13	15	25	9	5	[a] 15.3	33	12	20	17
465	13	M	Apr	[a] .33	5.2	1.030	1,125	[a] 150	11	2	50	15	25	10	27	4.2	450	11	18	14
466	12	M		[a] .30	5.5	1.027	996	[a] 210	<10	2	33	15	25	10	4	.8	0	11	18	14
491	13	M	May	.46	5.5	1.025	993	490	14	7	13	10	15	6	4	1.8	44	12	20	15
492	13	M		.46	5.4	1.015	574	920	<10	7	11	10	15	6	1	1.2	20	12	20	15
503			June	[a] .09	6.8	1.010	440	360	14	5		15	25	8				12	21	18
504		M		[a] .34	5.6	1.020	749	360	<10			15	25	8	13	4.8	325	12	21	18
515	13	M	July	1.08	5.9	1.018	735	980	23	23	14	0	0	0	2	1.6	22	8	14	10
516	10	M		.48	5.8	1.010	385	800				0	0	0	.4	.3	8	8	14	10
535	11	M	Aug	.90	5.5	1.020	573	530	23	12	5	14	24	9				9	16	13
536	10	M		[b] 1.71	5.6	1.023	759	1,140	22	25	9	14	24	9	2	1.8	10	9	16	13
547	13	M	Sept	.51	5.6	1.023	888	460	15	7	25	0	0	0	2	1.0	29	7	15	14
548	10	M		.44	6.5	1.024	924	[a] 340	<10	.3	1	0	0	0	1	[a] .2	11	7	15	14
571	10	M	Oct	.74	5.9	1.012	476	1,060	22	23	2	12	17	7	2	1.6	33	9	12	12
572		M		.43	5.4	1.020	468	740	<10	4	6	12	17	7	2	1.5	20	9	12	12
589		M	Nov	[a] .22	6.4	1.002	894	550	<10	5	10	0	0	0	1	.7	7	9	16	13
590		M	Dec	.06	5.5	1.025	717	420	<10	3	2	0	0	0	1	.3	10	9	17	15
1968																				
608	10	M	Jan	[a] .28	6.2	1.024	190	460	<10	3		0	0	0	1	.4	29	8	10	10
609	11	M		.34	6.2	1.011	754	480	11	5	17	0	0	0	1	.7	7	8	10	10
623	9	M	Feb	.61	6.3	1.025	901	580	<10	3		14	24	9	3	1.6	55	7	12	9
624	9	M		.45	6.4	1.028	942	440	13	6	14	14	24	9	2	.7	13	7	12	9
637			Mar	[a] .37	6.1	1.018	262	580				0	0	0		<1.0		7	10	13
646			Apr	[a] .22	5.5	1.031	960	[a] 155				0	0	0				9	10	17
665	11	M	May	[a] .28	6.1	1.030	2,300	[a] 220		1		0	0	0		<1.0		8	8	20
678	11	M	June	[a] .24	6.2	1.013	525	320				0	0	0	4	1.2	80	13	7	35
679	11	M		.51	5.1	1.035	1,600	460				0	0	0	3	1.4	25	13	7	35
690		M	July	.91	5.9	1.021	765	1,280	35	45	13	0	0	0	3	3.6	20	9	14	18
709	11	M	Aug	.62	6.6	1.019	670	1,200				0	0	0	2	2.8	25	6	9	10
720	12	M	Sept	1.17	5.1	1.022	815	850				0	0	0	2	1.9	10	11	19	17
735	11	M	Oct	1.40	6.2	1.026	805	720				0	0	0	2	1.3	25	9	14	13
745	11	M	Nov	.82	5.9	1.016	765	1,060	21	22	22	0	0	0	3	3.1	17	8	12	11
758	11	M	Dec	.63	5.7	1.031	1,310	460	13	6	12	11	22	7	3	1.3	14	12	24	17

[a] Values outside of the normal range, and excluded from further evaluation.

[b] Values outside of the normal range, but included in evaluation.

Table 6. Radiobioassay results, food and urine, ITDSN, Columbia, Miss., 1966–1968

ID	Age	Sex	Date	Urine								Food			Urine			Food		
				Creatinine (g/day)	pH	Specific gravity	Osmolality (mOs/kg)	Volume (ml)	Cesium-137 (pCi/liter)	Cesium-137 (pCi/day)	$^{137}Cs/K$ (pCi/g)	Cesium-137 (pCi/kg)	Cesium-137 (pCi/day)	$^{137}Cs/K$ (pCi/g)	Strontium-90 (pCi/liter)	Strontium-90 (pCi/day)	$^{90}Sr/Ca$ (pCi/g)	Strontium-90 (pCi/kg)	Strontium-90 (pCi/day)	$^{90}Sr/Ca$ (pCi/g)
1966																				
61	15	M	Jan	1.100	6.3	1,015		700	77	54	37				6	4	55			
62	16	M		1.490	5.3	1.015		1,960	38	72	24				3	6	48			
86	16	M	Feb	.730	6.0	1.022		570	67	38	17				8	5	73			
87	17	M		.710	6.3	1.009		1,420	41	58	19				4	6				
109	15	M	Mar	1.450	6.2	1.018		1,580	46	73	25				3	5	70			
110	16	M		1.185	6.3	1.013		1,520	45	68	43				2	3	17			
130	15	M	Apr	.673	7.1	1.020		580	76	44	27				4	2	50			
131	17	M		1.190	5.8	1.019		1,140	38	43	27				2	2	26			
165	16	M	May	•1.865	6.0	1.018		1,600	64	102	43				4	6	19			
166	17	M		1.065	5.8	1.018		660	77	51	44				5	3	59			
195	15	M	June	1.440	5.6	1.015		1,940	<10	<17										
196	16	M		1.430	5.9	1.026		840	39	33	27				7	6	33			
219	15	M	July	•1.760	5.7	1.030		740	72	53	21				9	7	36			
223	15	M		1.250	5.2	1.025		720	49	35	23				5	4	16			
231	15	M	Aug	.360	6.4	1.010		620	29	18	13				3	2	95			
234	17	M		.986	5.3	1.017		880	51	45	26				3	3	34			
249	17	M	Sept	1.020	5.4	1.013		1,080	22	24	18				3	3	41			
251	17	M		1.510	5.9	1.017		1,820	31	56	24				2	4	20			
291	17	M	Oct		6.2	1.016		1,600	27	43	16				4	6	49			
293	16	M		1.376	6.5	1.027		660	47	31	11				6	4	43			
344	17	M	Nov			1.014		1,500	45	67	36									
345	17	M				1.025		720	61	44	46									
365	16	M	Dec			1.025		1,320	25	33	15									
366	14	M				1.015		700	<10											
1967																				
378	17	M	Jan	.80	5.5	1.019		680	30	20	20				2	1.2	8			
379	16	M		1.17	5.3	1.018		900	21	19	17				2	1.4	14			
405	15	M	Fe	•1.75	5.1	1.026		1,180	45	53	19				10	11.5	62			
406	17	M		.88	4.9	1,030		420	32	13	45				4	1.7	16			
425	16	M	Mar	.77	5.6	1,025		1,340	30	40	13				2	2.8	15			
428	15	M		.94	5.5	1.025		900	20	18	12				2	2.0	17			
467	17	M	Apr	•2.92	5.5	1.025	934	1,760	26	46	13				1	2.5	5			
468	17	M		•2.03	5.5	1.021	832	1,720	24	41	11				2	3.8	11			
481	17	M	May	1.16	5.9	1.015	616	1,420	21	30	10				1	2.0	17			
482	14	M		1.14	5.6	1.025	974	720	19	14	12				3	2.1	23			
501	17	M	June	•1.92	5.4	1.025	1,500	800	33	26	13				3	2.6	18			
502	16	M		1.61	5.1	1.028	948	1,120	27	30	20				3	3.3	20			
519	17	M	July	.88	5.6	1.015	554	760	21	16	11				.3	.2	3			
520	17	M		1.23	5.9	1.018	681	770	22	17	15									
537	16	M	Aug	•1.71	5.9	1.020	691	1,037	29	30	11				.3	.3	18			
538	15	M		•2.13	5.4	1.015	533	1,060	24	25	12									
545	15	M	Sept	1.00	5.7	1.010	271	1,520	<10	< 5					2	2.3	67			
546	14	M		.66	5.7	1.027	1,800	660	33	22	20									
560	17	M	Oct	.65	5.7	1.015	455	680	<10	< 4					1	.8	7			
561	17	M		1.42	5.7	1.025	996	710	25	18	17				2	1.2	15			
573			Nov	.82	5.4	1.020	494	1,240	21	26	20				2	2.9	15			
574				[b].32	5.1	1.014	564	[b]280	<10	< 1					5	1.3	280			
591	18	M	Dec	•2.00	5.2	1,020	650	2,000	19	38	19				4	7.0	21			
592	17	M		1.34	5.5	1.015	566	1,260	10	13	9				3	3.9	33			

1968

600	17	M	Jan	0.92	6.2	1.032	824	840	27	23	12	20	35	12	4	3.4	17	12	21	15
601	16	M		.86	6.0	1.024	498	1,165	29	34	21	20	35	12	2	1.8	18	12	21	15
619	14	M	Feb	1.45	5.6	1.027	1,000	1,240	23	29	8	12	26	7	3	4.3	23	12	26	12
620	16	M		.94	6.2	1.013	464	1,460	24	35	11	12	26	7	1	1.6	9	12	26	12
638	15	M	Mar	[a] 1.65	5.2	1.030	1,650	780				15	29	10		< 1.0		10	19	10
639	17	M		1.43	6.0	1.023	909	860				15	29	10	2	1.8	9	10	19	10
649	16	M	Apr	.77	6.3	1.022	571	840	10	8	5	0	0	0	1	1.2	11	13	34	14
650	17	M		[b] .08	5.9	1.010	386	460				0	0	0		< 1.0		13	34	14
666	17	M	May	[a] 2.01	6.2	1.016	495	1,760				19	40	13	1	1.3	10	11	22	13
667	17	M		[a] 1.97	5.3	1.030	2,550	740	17			19	40	13	2	1.8	47	11	22	13
684	16	M	June	1.23	6.7	1.016	570	710				13	22	9	.7	.5	7	16	28	23
685	16	M		1.32	5.6	1.026	1,100	580	27	16	20	13	22	9	< 1	< .2		16	28	23
688	17	M	July	1.55	5.3	1.033	2,900	800	20	16	10	16	42	11	6	4.6	30	12	32	17
689		M		1.34	6.7	1.017	680	1,960	14	27	5	16	42	11	2	3.3	17	12	32	17
705	16	M	Aug	.87	5.7	1.030	1,950	440				14	33	8	4	1.7	11	12	28	13
706	17	M		.89	5.5	1.020	630	740				14	33	8	2	1.5	10	12	28	13
718	16	M	Sept		5.0	1.020	720	1,100	17	19	12	13	23	8	3	2.9	16	11	19	15
719	17	M			5.6	1.035	2,750	700	28	20	11	13	23	8	3	2.3	21	11	23	14
736	16	M	Oct	.69	5.5	1.015	500	425	24	10	29	16	34	11	1	.6	11	11	17	11
743	17	M	Nov	1.03	6.6	1.010	505	800	37	30	25	0	0	0	5	3.7	41	9	17	11
744	16	M		[a] 1.72	7.0	1.030	1,350	900	23	21	6	0	0	0	6	5.5	27	9	21	9
759	16	M	Dec	[a] 2.34	5.1	1.022	885	1,500	22	33	9	14	33	9	2	2.5	13	9	21	9
760	16	M		.79	6.3	1.016	515	1,000	15	15	9	14	33	9	1	.9	20	9	21	9

[a] Values outside of the normal range, but included in evaluation.
[b] Values outside of the normal range, and excluded from further evaluation.

Table 7. Radiobioassay results, food and urine, ITDSN, Portland, Oreg., 1966–1968

ID	Age	Sex	Date	Urine							Food			Urine			Food		
				Creatinine (g/day)	pH	Specific gravity	Osmolality (mOs/kg)	Volume (ml)	Cesium-137 (pCi/liter)	Cesium-137 (pCi/day)	$^{137}Cs/K$ (pCi/g)	Cesium-137 (pCi/kg)	Cesium-137 (pCi/day)	$^{137}Cs/K$ (pCi/g)	Strontium-90 (pCi/liter)	Strontium-90 (pCi/day)	$^{90}Sr/Ca$ (pCi/g)	Strontium-90 (pCi/kg)	Strontium-90 (pCi/day)	$^{90}Sr/Ca$ (pCi/g)
1966																				
69	16	M	Jan	1.450	5.8	1.020		1,340	47	63	19	50	85	33	3	3.4	28	10	17	14
70	16	M		[a] 1.900	6.0	1.024		980	51	50	14	50	85	33	5	4.9	26	10	17	14
90	17	M	Feb	1.190	6.2	1.012		1,565	33	52	28	70	105	44	4	5.7	57	17	26	22
91	16	M		1.270	6.4	1.013		1,380	57	79	31	70	105	44	5	6.4	49	17	26	22
96	17	M	Mar	[a] 1.850	6.3	1.024		740	112	83	32	40	50	28	4	2.9	32	12	16	18
97	15	M		[a] 2.390	6.9	1.021		1,660	74	123	27	40	50	28	3	5.6	165	12	16	18
116	16	M	Apr	.940	5.6	1.022		720	40	29	25	65	95	41	4	3.0	43	20	29	26
117	15	M		1.128	6.5	1.021		1,200	19	23	10	65	95	41	2	2.7	16	20	29	26
156	15	M	May	.864	9.8	1.018		1,600	20	32	14	40	60	23	.4	.6	6	18	27	23
157	15	M		1.190	8.0	1.020		1,300	47	61	30	40	60	23	2	2.9	22	18	27	23
179	16	M	June	1.016	6.5	1.024		520	75	39	41	50	80	3.5	4	2.1		29	45	35
180	16	M		.902	6.3	1.015		1,540	42	64	41	50	80	3.5	2	2.6		29	45	35
213	16	M	July	[a] 1.670	6.6	1.020		1,440	44	63	19	40	65	26	2	2.7	33	15	25	19
214	15	M		.843	5.6	1.022		740	39	29	11	40	65	26	5	4.0	22	15	25	19
237	15	M	Aug	[a] 2.220	5.8	1.022		1,520	56	85	23				2	2.4	39			
238	15	M		[a] 2.080	6.0	1.017		1,600	32	51	17				2	2.6	24			
246	17	M	Sept	1.440	6.5	1.020		1,820	23	42	14	40	70	27	3	5.1	22	15	26	19
247	16	M	Oct	[a] 2.000	5.8	1.022		980	62	61	21	5	10	5	3	3.1	14	18	33	15
279	15	M	Nov	1.430	6.5	1.017		1,080	42	45	23	45	85	31	5	5.6	2	16	31	13
280	15	M	Dec	1.040	6.8	1.007		1,920	26	50	17	40	55	21				7	10	11
1967																				
369	16	M	Jan	.54	5.8	1.005		1,080	29	31	28	45	85	34	1	.7	25	8	16	11
388	13	M	Feb						28			20	35	17				10	17	12
389	14	M							50			20	35	17				10	17	12
423	14	M	Mar	[a] 1.74	6.3	1.016		1,300	23	30	16	10	15	5	2	2.6	50	6	10	10
424	16	M		1.29	6.6	1.027		570	33	19	17	10	15	5	4	2.2	43	6	10	10
457	15	M	Apr	.98	6.3	1.005	282	2,120	35	74	27	15	25	8	1	1.5	11	8	13	12
458	15	M		[b] .37	5.0	1.004	210	1,840	< 10	< 2		15	25	8	.5	.9	17	8	13	12
477	15	M	May	.80	5.1	1.025	953	600	16	10	11	35	65	20	3	1.6	33	11	21	19
478	15	M		[b] .19	6.5	1.007	266	720	14	10	20	35	65	20	2	1.3	33	11	21	19
493	12	M	June	.99	5.9	1.015	578	1,300	43	56	22	30	55	19	3	3.9	15	7	13	12
494	14	M		1.85	6.1	1.016	669	1,380	52	72	25	30	55	19	3	3.8	50	7	13	12
521	17	M	July	1.43	6.5	1.003	170	3,580	18	64	20	18	34	10	1	5.1	50			
522	15	M		[a] 1.89	5.7	1.005	288	2,100	14	29	12	18	34	10	2	3.6	40			
533	14	M	Aug	[a] 2.70	6.5	1.010	438	2,250	22	50	10	0	0	0	1	2.1	50	7	15	8
534	15	M		[a] 2.86	6.2	1.015	683	1,680	19	32	12	0	0	0	1	1.7	25	7	15	8
551	14	M	Sept	1.06	6.2	1.015	562	880	< 10	< 8		20	28	11	1	.6	8	6	12	12
552	15	M		[a] 1.67	6.3	1.009	246	2,252	11	25	9	20	28	11	1	1.5	13	6	12	12
565	16	M	Oct	[a] 2.34	5.7	1.023	871	960	30	29	13	20	45	16	2	1.9	13	5	12	11
566	15	M		1.11	5.9	1.025	990	415	12	< 5	10	20	45	16	6	2.3	43	5	12	11
575	15	M	Nov	.84	6.6	1.011	273	1,680	15	25	11	12	25	8	1	1.7	33	6	14	14
576		M		1.58	6.6	1.013	534	1,440	30	43	11	12	25	8	1	1.3	7	6	14	14
587	16	M	Dec	[a] 2.23	6.7	1.004	106	2,155	< 10	< 17		22	39	11	.3	.6	10	4	6	4
588	17	M		[a] 2.63	6.7	1.002	130	4,400	< 10	< 4		22	39	11	1	3.7	33	4	6	4

											1968								
604	16	M	Jan	[a] 2.81	6.3	1.025	929	1,080	113	122	43	11	27	6	2	2.2	18	9	23	14
605	14	M		[a] 4.51	6.4	1.010	210	3,888	< 10	<31		11	27	6	1	2.6	19	9	23	14
616	16	M	Feb	.88	6.4	1.014	315	1,540	27	42	23	23	54	9	1	1.0	1	5	13	14
631	16	M	Mar	1.28	6.6	1.023	871	700				35	85	18		<1.0		5	13	11
632	16	M		[b] .15	6.5	1.005	110	940				35	85	18		<1.0		5	13	11
647	17	M	Apr	[a] 1.85	6.4	1.020	487	1,860	15	28	10	20	44	12		<1.0		6	13	10
648	17	M		[a] 1.98	6.2	1.014	506	2,135	< 10	< 9		20	44	12	1	1.1	3	6	13	10
657	15	M	May	.85	5.7	1.014	395	1,120	13	15	8	14	33	9	2	1.8	16			
658	18	M		[a] 1.70	6.1	1.010	303	2,900	12	35	13	14	33	9	1	1.9	8			
682	15	M	June	.38	5.7	1.012	375	1,580				23	53	14	1	1.0	25	6	14	10
683	14	M			9.7	1.020	915	1,160	25	29	7	23	53	14				6	14	10
691	16	M	July	[a] 1.67	6.5	1.010	330	3,069	18	55	15				1	1.8	20			
692	15	M		[a] 1.62	6.1	1.011	420	1,920	24	46	15				2	3.1	18			
707	17	M	Aug	.55	5.8	1.017	565	410				0	0	0	2	1.5	29	7	15	14
708		M		1.61	5.8	1.025	885	730				0	0	0	1	.8	33	7	15	14
716	17	M	Sept	1.41	5.8	1.015	575	1,300	33	43	12	18	35	12	2	2.6	18	6	11	11
717	16	M		1.27	5.3	1.025	995	740	30	22	10	18	35	12	4	3.3	14	6	11	11
725	17	M	Oct	[a] 2.21	6.2	1.011	290	2,500	12	30	8	0	0	0	1	2.0	33	8	17	12
726	15	M		[a] 2.37	5.7	1.016	600	1,360	21	29	11	0	0	0	1	1.3	9	8	17	12
746	16	M	Nov	[a] 1.79	5.7	1.017	500	1,160	15	17	15	17	34	9	2	2.4	14	5	11	8
747	15	M		[a] 1.63	6.3	1.012	450	780	18	14	28	17	34	9	1	1.1	17	5	11	8
750	16	M	Dec	[a] 2.09	5.4	1.016	675	1,320	13	17	8	0	0	0	1	1.4	33	3	6	5
751	16	M		[a] 1.89	6.5	1.011	270	3,075	< 10	<15	6	0	0	0	1	1.8	25	3	6	5

[a] Values outside of the normal range, but included in evaluation.

[b] Values outside of the normal range, and excluded from further evaluation.

Table 8. Radiobioassay results, food and urine, ITDSN, Sioux Falls, S. Dak., 1966

ID	Age	Sex	Date	Urine							Food	Urine			Food		
				Creatinine (g/day)	pH	Specific gravity	Volume (ml)	Cesium-137 (pCi/liter)	Cesium-137 (pCi/day)	$^{137}Cs/K$ (pCi/g)	Cesium-137 (pCi/day)	Strontium-90 (pCi/liter)	Strontium-90 (pCi/day)	$^{90}Sr/Ca$ (pCi/g)	Strontium-90 (pCi/kg)	Strontium-90 (pCi/day)	$^{90}Sr/Ca$ (pCi/g)
											1966						
65	11	F	Jan	[a] 0.210		1.025	[a] 220	150	33	40	120	4	0.9	56	14	24	17
66	11	F		.392	6.6	1.020	350	89	31	33	120	5	1.6	25	14	24	17
77	11	F	Feb	.750	5.9	1.028	520	52	27	20	75	2	.8	57	13	25	17
78	11	F		[a] .280	6.8	1.018	[a] 250	48	12	11	75	4	.9	100	13	25	17
99	11	F	Mar	.456	6.8	1.026	[a] 240	100	24	32	110	10	2.5	93	14	25	17
135	11	F	Apr	[a] .286	6.4	1.028	[a] 120	217	26	28	110	8	.9	20	17	29	12
136	11	F		[a] .336	5.9	1.027	[a] 210	110	23	19	110	10	2.0	33	17	29	13
161	11	F	May	.707	6.2	1.017	900	51	46	16	70	1	1.0	18	14	24	10
162	11	F		.468	6.2	1.019	440	93	41	36	70	3	1.2	63	14	24	10
200	11	F	June	[a] .189	6.7	1.010	370	19	7	11	55				12	19	8
197	12	F		.548	6.5	1.019	530	72	38	26	55	2	1.3	13	12	19	8

[a] Values outside of the normal range, and excluded from further evaluation.

Table 9. Radiobioassay results, food and urine, ITDSN, Austin, Texas, 1966–1967

ID	Age	Sex	Date	Urine							Food			Urine			Food		
									Cesium-137			Cesium-137			Strontium-90			Strontium-90		
				Creatinine (g/day)	pH	Specific gravity	Osmolality (mOs/kg)	Volume (ml)	(pCi/liter)	(pCi/day)	^{137}Cs/K (pCi/g)	(pCi/kg)	(pCi/day)	^{137}Cs/K (pCi/g)	(pCi/liter)	(pCi/day)	^{90}Sr/Ca (pCi/g)	(pCi/kg)	(pCi/day)	^{90}Sr/Ca (pCi/g)
1966																				
82	11	M	Jan	0.725	6.1	1.022		770	29	22	10	20	30	15	4	2.9	24	8	13	13
83	10	M		.555	6.6	1.021		460	61	28	21	20	30	15	2	1.0	33	8	13	13
103	11	M	Feb	.900	5.9	1.017		980	35	34	19	15	25	10	1	.8	18	7	12	12
104	10	M		.600	6.0	1.023		600	53	32	28	15	25	10	5	2.7	34	7	12	12
137	10	M	Mar	[b] .326	6.0	1.021		[b] 340	38	13	21	25	40	17	4	1.8	34	7	12	12
138	11	M		[b] .362	6.2	1.026		355	28	10	16	25	40	17	3	1.2	17	7	12	12
158	11	M	Apr	.472	8.4	1.020		660	55	36	43	25	40	18	4	2.8	35	6	10	13
159	10	M		[b] .271	7.9	1.018		460	26	12	11	25	40	18	3	1.6	10	6	10	13
191	12	M	May	.522	6.2	1.020		580	26	15	15	15	25	13	4	2.2	13	6	10	10
192	11	M		.860	6.5	1.016		970	31	30	21	15	25	13	1	1.2	24	6	10	10
227	12	M	June	.562	6.0	1.015		560	< 10			25	40	20	3	1.4	10	10	17	21
228	9	M		.488	6.3	1.015		400	< 10			25	40	20	3	1.3		10	17	21
240	9	F	July	.400	5.7	1.018		830	12	10	9	15	30	10	[b] 25	21.0	191	7	13	14
241	11	M		.750	5.9	1.017		1,340	21	28	16	15	30	10	1	1.1	21	7	13	14
248	11	M	Aug	.400	5.5	1.024		[b] 335	39	13	9	15	20	11	5	1.6	40	8	12	14
285	11	M	Sept	[b] .174	7.3	1.018		[b] 130	< 10			10	20	9	11	6.6	1,100	7	15	19
286	9	M	Oct	.730	6.2	1.016		580	< 10	< 2		15	25	11	5	1.6	32	7	11	12
338	9	M	Nov			1.015		300	50	15	30	5	5	3				7	10	17
339	10	M				1.017		600	17	10	6	5	5	3				7	10	17
359	9	M	Dec			1.015		[b] 200	45	9	13	15	25	12				7	12	14
360	11	M				1.014		1,340	14	19	9	15	25	12				7	12	14
1967																				
382	10	M	Jan	.50	4.9	1.028		[b] 300	< 10	< 2	6	15	25	10	1	.3	14	8	13	13
383	9	M		.97	5.9	1.025		830	27	22	25	15	25	10	2	1.8	17	8	13	13
401	11	M	Feb	[b] .29	5.4	1.012		450	13	6	32	5	10	6	2	.1	33	6	9	15
402	10	M		.48	4.8	1.025		390	21	8	19	5	10	6	3	1.3	27	6	9	15
426	11	M	Mar	1.03	6.0	1.017		900				10	20	8	3	2.4	50	5	9	8
427	10	M		[b] .28	5.3	1.022		[b] 190				10	20	8	7	1.3	140	5	9	8
473	9	M	Apr	.90	9.0	1.020	836	960	25	24	15	10	15	7	1	1.3	50	7	8	8
474	10	M		.84	6.3	1.018	692	1,200	31	37	16	10	15	7	2	2.7	33	7	8	8
489	11	M	May	[b] .04	6.5	1.010	464	[b] 91				5	10	5				5	5	8
490	10	M		[b] .19	5.1	1.024	871	[b] 240	< 10	< 1	14	5	10	5	3	.8	75	5	5	8
505	9	M	June	.54	7.7	1.020	825	600	17	10	9	15	25	10	2	1.2	[b] 100	5	9	8
506	10	M		.80	6.0	1.027	1,300	500	21	11	11	15	25	10	7	3.7	[b] 100	5	9	8
523	10	M	July									0	0	0				3	6	6
524	11	M		.53	5.7	1.025	171	[a] 240	< 10	< .5	2	0	0	0				3	6	6
539	12	M	Aug	1.20	5.9	1.016	527	480	< 10	< 2	11	0	0	0	3	1.2	43	8	12	13
540	10	M		.70	6.5	1.020	723	[b] 250	11	3		0	0	0	11	2.8	110	8	12	13
549	10	M	Sept	[b] .33	5.8	1.023	912	[b] 225	< 10	< 1	11	0	0	0	2	.5	13	5	8	9
550	11	M		[b] .27	5.3	1.022	981	[b] 140	< 10	< 1	33	0	0	0	4	.5	44	5	8	9
562	11	M	Oct	.70	6.0	1.015	555	1,000	10	10	10	0	0	0	2	.2	7	4	7	8
563	11	M		1.09	6.2	1.023	920	1,025	23	24	9	0	0	0	2	2.1	22	4	7	8
569	10	M	Nov	[b] .14	6.9	1.030	871	[b] 125				0	0		17	2.1	189	6	10	10
570	11	M		.91	5.7	1.025	1,200	700	13	9	7	0	0		4	3.0	44	6	10	10
595	11	M	Dec	[b] .14	5.3	1.030	1,350	[b] 95				0	0	0				7	13	13

[a] Values outside of the normal range, but included in evaluation.

[b] Values outside of the normal range, and excluded from further evaluation.

Table 10. Radiobioassay results, food and urine, ITDSN, Burlington, Vt., 1966–1967

ID	Age	Sex	Date	Urine								Food			Urine			Food		
				Creatinine (g/day)	pH	Specific gravity	Osmolality (mOs/kg)	Volume (ml)	Cesium-137 (pCi/liter)	Cesium-137 (pCi/day)	$^{137}Cs/K$ (pCi/g)	Cesium-137 (pCi/kg)	Cesium-137 (pCi/day)	$^{137}Cs/K$ (pCi/g)	Strontium-90 (pCi/liter)	Strontium-90 (pCi/day)	$^{90}Sr/Ca$ (pCi/g)	Strontium-90 (pCi/kg)	Strontium-90 (pCi/day)	$^{90}Sr/Ca$ (pCi/g)
1966																				
57	11		Jan	0.730	5.4	1.032		400	131	52	28	65	85	39	12	4.8	53	12	16	18
58	10			.550	5.7	1.020		500	54	27	16	65	85	39	3	1.3	76	12	16	18
81	12		Feb	.540	6.8	1.016		900	43	39	23	40	55	28	4	3.8	292	13	18	18
95	9		Mar	.485	5.7	1.028		425	129	55	33	45	55	31	13	5.7	228	11	13	16
98	11			.640	6.1	1.022		800	59	47	29	45	55	31	5	3.6	55	11	13	16
132	12		Apr	1.188	6.7	1.021		540	69	37	26	50	60	30	5	2.9	41	11	13	19
133	11			[b] .310	7.4	1.021		[b] 275	76	21	14	50	60	30	7	1.8	51	11	13	19
160	9		May	[b] .268	8.8	1.020		480	58	28	30	55	70	35	5	2.2	55	16	20	22
189	9		June	[b] .365	5.9	1.024		320	72	23	43	40	50	28	4	1.2	32	13	15	21
190	11			.510	6.5	1.026		440	91	40	36	40	50	28	5	2.0	26	13	15	21
215	9		July	.540	5.9	1.019		540	70	38	36	45	60	25	4	2.1	23	15	20	22
216	11		Aug	.560	6.2	1.023		500	114	57	33	40	45	30	7	3.4	38	7	8	12
244	10		Sept	[b] .168	7.1	1.018		[b] 300	67	20	24	30	35	21	4	1.2	44	9	11	18
245	9			.387	5.9	1.027		380	47	18	17	30	35	21	4	1.4	25	9	11	18
281	9		Oct	.378	6.6	1.010		860	20	17	12	30	40	18				12	15	19
282	11			.595	6.3	1.027		[b] 320	69	22	15	30	40	18	10	3.2	333	12	15	19
340	11		Nov			1.019		580	67	39	24	40	55	20				12	17	19
341	12					1.022		680	76	52	19	40	55	20				12	17	19
354	14		Dec			1.026		860	64	55	35	30	40	19				10	13	12
355	11					1.018		560	36	20	11	30	40	19				10	13	12
1967																				
370	11		Jan	.70	5.7	1.014		1,000	26	26	12	30	40	15	1	.8	25	13	17	19
371	11			.63	5.8	1.026		520	29	15	12	30	40	15	3	1.5	30	13	17	19
396	11	M	Feb	[a] .14	6.3	1.026		[a] 130	13	2	12	20	25	10	13	1.7	19	12	16	18
397	12	M		.96	4.7	1.020		1,000	33	33	16	20	25	10	1	1.4	17	12	16	18
421	10		Mar	.58	6.0	1.026		370	< 10	< 1		30	35	18	3	1.2	50	11	13	12
422	10			.60	6.3	1.020		550	15	8	11	30	35	18	3	1.4	150	11	13	12
459	10		Apr	[a] .35	6.1	1.026	1,020	[a] 290	12	3	6	15	15	9	3	1.0	21	13	12	17
460	12			.71	5.8	1.030	981	380	22	8	28	15	15	9	3	1.2	23	13	12	17
487	12	F	May	.67	5.9	1.015	640	800	10	8	5	20	25	13	1	.9	33	11	13	14
488	12			1.05	5.5	1.032	1,066	780	16	12	6	20	25	13	1	.9	50	11	13	14
495	10	M	June	.68	5.5	1.022	891	570	< 10	< 5		15	15	7	5	2.7	45	8	9	13
496	11	M		[a] .24	5.4	1.015	645	[a] 300	18	5	36				8	2.4	267	8	9	13

[a] Values outside of the normal range, but included in evaluation.

[b] Values outside of the normal range, and excluded from further evaluation.

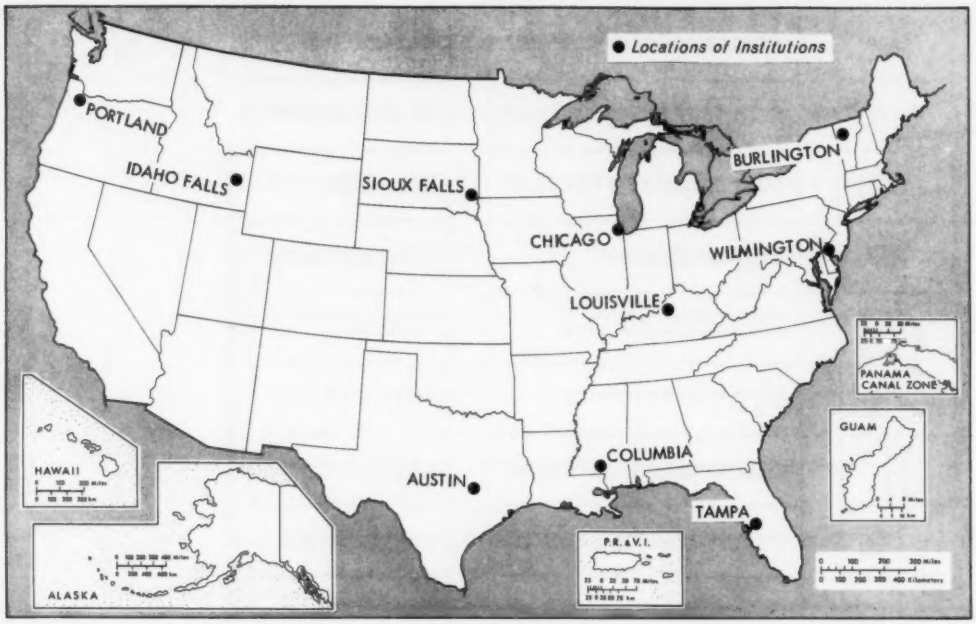

Figure 1. Locations of institutions

(*6*) MOGHISSI, A. A., M. G. MAYES, and M. W. CARTER. Radiobioassay program of the Institutional Total Diet Sampling Network: IV. Evaluation of the ^{90}Sr data for children. Proceedings of the Second International Conference on Strontium Metabolism, Glasgow, Scotland, August 16–18, 1972 (in press).

(*7*) CLARK, Jr., L. C. and H. L. THOMPSON. Determination of creatine and creatinine in urine. Anal Chem 21:1218 (October 1949).

(*8*) CAHILL, D. F. and G. I. LINDSEY. Determination of strontium-90 in urine by anion exchange. Anal Chem 38:639 (1966).

(*9*) BUREAU OF RADIOLOGICAL HEALTH. Radionuclides in Institutional total diet samples, January–March 1966. Radiol Health Data Rep 7:580–583 (1966); April–June 1966, 8:15–18 (January 1967); July–September 1966, 8:209–212 (April 1967); October–December 1966, 8:388–391 (July 1967); January–March 1967, 8:591–596 (October 1967); April–June 1967, 9:34–36 (January 1968); July–September 1967, 9:217–220 (April 1968); October–December 1967, 9:359–363 (July 1968); January–March 1968, 9:557–560 (October 1968); April–June 1968, 10:22–25 (January 1969); July–September 1968, 10:150–152 (April 1969); October–December 1968, 10:308–311 (July 1969).

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State Environmental Radioactivity Surveillance Programs, 1972

Mary Ann Culliton[1]

This report presents a summary of State environmental radioactivity surveillance programs for 1972. Information is given in table form on sample media, sites, collection and analysis frequency, and types of analysis performed.

This report summarizes environmental radioactivity surveillance programs conducted by State agencies during 1972. These surveillance programs are conducted by States in partial fulfillment of their obligation to assure a quality environment and to protect the health and safety of the public. Information is given on sample media, sites, collection and analysis frequency, and the types of analyses performed. The total area and resident population of each State are also included.

Data made available to the Office of Radiation Programs, EPA, from the operation of these programs will be included in the National Environmental Radiation Data System now being designed and developed. This system will serve as a central source of environmental radiation data which can be used to assess the impact of environmental radioactivity on a national basis. The data will be used to assist in the analysis of radiological conditions for any area of the United States and will provide information for the detection of trends, long-term buildup of radioactivity, and to assess the influence of nuclear industry effluents on environmental conditions.

Most State radioactivity surveillance programs were started in the 1950's when fallout from nuclear weapons testing contributed significantly to natural background radiation levels. With fallout becoming less important as a source of environmental radioactivity, the data from these surveillance programs are now used to measure ambient levels, trends, environmental concentration factors and as a base for evaluating the environmental impact of nuclear industry effluents.

Many States have changed their routine surveillance programs to intensive sampling near nuclear facilities which discharge radioactivity to the environment. The analyses of these source-oriented samples are more detailed than the fallout program measurements and include analyses for specific radionuclides related to the nuclear facility discharges. These measurements can be used to compare the contribution of nuclear industry discharges to ambient radioactivity levels. They can also be used in some instances to confirm compliance with environmental standards.

In addition to the State surveillance programs summarized in this report, environmental radioactivity surveillance programs are conducted by other organizations in support of their activities. These organizations include the Environmental Protection Agency, Atomic Energy Commission, universities, and nuclear facility operators.

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Table 1. Summary of State environmental surveillance programs, 1972

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis								
				γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
ALABAMA													
Population: 3,444,200 Area: 51,609 mi²													
Air:													
General	2	Monthly	Monthly		X	X							
	1	Monthly	Monthly			X							
Source oriented:													
Browns Ferry	8	Monthly	Monthly			X							
Milk:													
General	19	(a)	6/annum				X	X	X	X	X	X	
Source oriented:													
Browns Ferry:													
Raw	1	Monthly	Monthly				X	X	X	X	X	X	
Pasteurized	4	Monthly	Monthly				X	X	X	X	X	X	
Miscellaneous:													
General:	0												
Source oriented:													
Browns Ferry:													
External radiation (TLD)	15	Quarterly	Quarterly										(b)
Soil	4	Quarterly	Quarterly	X	X	X							
Vegetation	4	Quarterly	Quarterly	X	X	X						X	
Fish mussels	1	Semiannually	Semiannually	X	X	X						X	
Silt	1	Not reported	Not reported	X	X	X						X	
Water:													
General:													
Surface	26	Quarterly	Quarterly			X							
Source oriented:													
Browns Ferry:													
Surface, public supply	2	Weekly composite	Monthly		X	X							
Surface, public supply	2	Quarterly	Quarterly			X							

[a] Bimonthly to monthly.

[b] Gross gamma radioactivity.

ALASKA

Population: 302,200
Area: 586,412 mi²

Air	0												
Milk	0												
Miscellaneous	0												
Water	0												

ARIZONA

Population: 1,772,500
Area: 113,909 mi²

Air	0												
Milk	0												
Miscellaneous	0												

Water:
Arizona conducts a gross alpha and beta analysis on all new public water supplies.

Table 1. Summary of State environmental surveillance programs, 1972—continued

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis									
				γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
ARKANSAS													
Population: 1,923,300 Area: 53,104 mi²													
Air:													
General	1	3/week	3/week			X							
Source oriented:													
SEFOR	1	3/week	3/week	(a)		X							
Milk:													
General	8	Monthly	Monthly				X	X	X	X	X	X	
Source oriented:													
SEFOR	4	Monthly	Monthly				X	X	X	X			
ANO	4	Quarterly	Quarterly				X	X	X	X			
ANO	3	Quarterly	Quarterly				X	X	X	X	X	X	
Miscellaneous:													
General	0												
Source oriented:													
SEFOR:													
Silt	3	Quarterly	Quarterly		X	X	X	X	X	X			(b, c)
Soil	4	Quarterly	Quarterly		X	X	X	X	X	X			(b, c)
Vegetation	4	Quarterly	Quarterly		X	X	X	X	X	X			(b, c)
ANO:													
Silt	6	Semiannually	Semiannually		X	X	X	X	X	X			(b, c)
Soil	3	Semiannually	Semiannually		X	X	X	X	X	X			(b, c)
Vegetation	5	Semiannually	Semiannually		X	X	X	X	X	X			(b)
Food	3	Semiannually	Semiannually		X	X	X	X	X	X			(b)
Thyroid (beef)	2	Monthly	Monthly				X	X	X	X			(b)
Water:													
General:													
Precipitation	1	As available	As available			X	X	X	X	X			(b)
Ground and surface public supplies	462	Triennial	Triennial		X	X							
Source oriented:													
SEFOR:													
Surface	5	Quarterly	Quarterly		X	X	X	X	X	X			(b)
ANO:													
Surface	4	Semiannually	Semiannually		X	X	X	X	X	X			(b)
Ground	2	Semiannually	Semiannually		X	X	X	X	X	X			(b)

(a) Gamma scan if beta is high.
(b) ^{144}Ce, ^{106}Ru, ^{95}Zr, ^{54}Mn, ^{65}Zn.
(c) ^{228}Th, ^{214}Bi.

ANO, Arkansas Nuclear One.
SEFOR, Southwest Experimental Fast Oxide Reactor.

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis									
				γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
CALIFORNIA													
Population: 19,953,100 Area: 158,693 mi²													
Air:													
General	10	5/week	Daily	(a)		X					(a)	(a)	
	2	7/week	Daily	(a)		X					(a)	(a)	
	1	7/week	Daily	(a)	X	X					(a)	(a)	
	1	5/week	Daily	(a)	X	X					(a)	(a)	
Source oriented:													
Diablo Canyon	2	1/year	Annually	X		X							
Humboldt Bay	1	1/year	Annually	X		X							
San Onofre	2	1/year	Annually	X		X							
Rancho Seco	1	1/year	Annually	X		X							(b)
Diet:													
General	20	21 meals	Quarterly	X					X		X	X	(c)
Source oriented	0												
Milk:													
General:													
Pasteurized	10	Monthly	Monthly	X			X	X	X	X	X	X	(d)
Powdered	3	Monthly	Monthly	X			X	X	X	X	X	X	
Source oriented:													
Diablo Canyon	2	Annually	Annually	X			X						
Humboldt Bay	2	Annually	Annually	X			X						
Rancho Seco	3	Annually	Annually	X			X						
Miscellaneous:													
General:													
Sewage	20	Monthly	Monthly		X	X							
Sewage	3	Quarterly	Quarterly		X	X							

See footnotes at end of table.

Table 1. Summary of State environmental surveillance programs, 1972—continued

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis									
				γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
CALIFORNIA—continued													
Source oriented:													
San Onofre:													
Film badge	11												(a)
Cucumber, tomato, bell pepper cauliflower, green cabbage	5	Annually	Annually	X		X				X			
Femur, thyroid (rabbit)	1	Annually	Annually	X			X			X	X	X	
Soil	5	Annually	Annually										(f)
Kelp, bass, spiney crab, rock crab, etc	3	Annually	Annually				X			X			
Humboldt Bay:													
Brown algae	3	Annually	Annually			X							
Bovine thyroid	1	Annually	Annually	X			X						
Crab, fish, shrimp, gaper clam	1	Annually	Annually			X							
Pacific oyster	1	Annually	Annually	X		X							
Bottom sediment	3	Annually	Annually	X		X							
Diablo Canyon:													
Kelp, brown algae, rockfish, clam, salmon, etc	7	Annually	Annually	X		X							
External radiation (TLD)	6	Annually	Annually										(a)
Diablo Canyon:													
Bovine thyroid	1	Annually	Annually	X			X						
Leafy vegetables	1	Annually	Annually	X		X							(c)
Red abalone	1	Annually	Annually	X		X							(c)
Leaf barnacles and/or mussels	1	Annually	Annually	X		X							(c)
Rockfish	1	Annually	Annually	X		X							(c)
Bottom sediment	1	Annually	Annually	X									(c)
Rancho Seco:													
Vegetation	3	Annually	Annually	X		X	X						
External radiation (TLD)	6	Annually	Annually										
Grazing animal thyroid	2	Annually	Annually	X			X						
Mud and silt	2	Annually	Annually	X		X	X						
Water:													
General:													
Precipitation	1	(g)	(g)			X		MC			MC	MC	(h)
Wet and dry fallout	3	Monthly	Monthly					X			X	X	(h)
Ground, public supply	5	Monthly	Monthly		X			YC			YC	YC	(i)
Surface, public supply	7	Monthly	Monthly		X			YC			YC	YC	(i)
Surface, public supply	1	9/year	9/year		X			YC			YC	YC	(i)
Surface, public supply	1	8/year	8/year		X			YC			YC	YC	(i)
Surface, public supply	1	11/year	11/year		X			YC			YC	YC	(i)
Surface, public supply	1	Semiannually	Semiannually		X			YC			YC	YC	(i)
Surface, public supply	2	8/year	8/year		X			YC				YC	(i)
Surface, public supply	1	11/year	11/year		X			YC				YC	(i)
Source oriented:													
Diablo Canyon:													
Sea water	1	Annually	Annually			X							(a)
Humboldt Bay:													
Public supply	1	Annually	Annually			X							
San Onofre:													
Public supply	2	Annually	Annually			X							
Secondary cooling	1	Annually	Annually			X				X			
Rancho Seco:													
Public supply	1	Annually	Annually			X				X			
Secondary cooling	1	Annually	Annually			X				X			
Offsite drainage	2	Annually	Annually			X				X			

[a] Monthly composite.
[b] ^{95}Zr-^{95}Nb.
[c] ^{226}Ra, ^{54}Mn, ^{95}Zr-Nb, $^{141-144}Ce$, Na, Ca, K.
[d] ^{54}Mn, ^{95}Zr-Nb, Ca, ^{106}Ru-Rh, $^{141-144}Ce$.
[e] Gross gamma.
[f] Stored.
[g] Every 24 hours when rain occurs.
[h] ^{54}Mn, ^{95}Zr-Nb, ^{106}Ru-Rh, $^{141-144}Ce$—monthly composite.
[i] ^{54}Mn, ^{95}Zr-Nb, $^{141-144}Ce$, ^{226}Ra—one year composite.
MC, monthly composite.
YC, yearly composite.

Table 1. Summary of State environmental surveillance programs, 1972—continued

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis: γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
COLORADO													
Pop: 2,207,300													
Area: 104,247 mi²													
Air:													
General	46	1/4 days	1/4 days	(a)	X	X							(b)
Source oriented:													
Rocky Flats and Fort St. Vrain	3	1/4 days	1/4 days	(a)	X	X							(b)
Nuclear Generating Plant	4	1/4 days	1/4 days	(a)	X	X							^{239}Pu [b]
Fort St. Vrain Nuclear Generating Plant	15	1/4 days	1/4 days	(a)	X	X							(b)
Rocky Flats	11	1/4 days	1/4 days	(a)	X	X							(b)
	4	1/4 days	1/4 days	(a)	X	X							^{239}Pu [b]
	5	1/48 hour	1/48 hour	(a)	X	X							^{239}Pu [b]
Rulison Project	8	1/4 days	1/4 days	(a)	X	X							(b)
Milk:													
General	6	Monthly	Monthly	X			X	X	X	X			
	1	Monthly	Monthly	X			X	X	X	X			
	1	Monthly	Monthly	X			X	X	X	X			
Source oriented:													
Rulison Project	6	Sporadic	As collected				X	X	X	X			
Miscellaneous	0												
Water:													
General:													
Surface	122	Quarterly	Quarterly		X	X							^{226}Ra
Public supply	451	Biannually	Biannually		X	X							^{226}Ra
Source oriented:													
Rocky Flats:													
Surface	1	48 hours	48 hours		X	X							
Fort St. Vrain Nuclear Generating Plant													
Surface	8	Monthly	Monthly	X	X	X							^{3}H
Rulison Project:													
Surface	24	Sporadic	Sporadic		X	X							^{226}Ra
	3	Quarterly	Quarterly		X	X							^{3}H, [c]
Uravan-Uranium Mill:													
Surface	4	Standby	Standby										^{226}Ra
	3	Monthly	Monthly		X	X							^{226}Ra
Ground	1	Standby	Standby										^{226}Ra
Public supply	2	Monthly	Monthly		X								(d)
Effluent and waste water	3	Monthly	Monthly		X	X							^{226}Ra
Special ^{3}H Network	8	Monthly	Monthly										(e)

[a] If sample exceeds normal gross alpha and/or gross beta background concentrations.
[b] Alpha spectrum—if sample exceeds normal gross alpha concentration.
[c] ^{226}Ra analysis done when sample shows gross alpha >10 pCi/liter.
[d] ^{238}U natural series.
[e] ^{3}H analysis done by National Environmental Research Center—Las Vegas, Nevada.

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis: γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
CONNECTICUT													
Pop: 3,032,200													
Area: 5,009 mi²													
Air	0												
Milk:													
General	(a)	Monthly	Monthly				X	X	X		X	X	
Source oriented:													
Haddam Neck	[b]3	Quarterly	Quarterly				X	X	X	X	X	X	
Millstone Station	[b]3	Quarterly	Quarterly				X	X	X	X	X	X	
Miscellaneous:													
General:													
Sewage	3	Annually	Annually		X	X							
Source oriented:													
Haddam Neck:													
Sediment	4	Monthly	Monthly	X		X							
Fish	1	Semiannually	Semiannually	X		X							
Fodder	3	Semiannually	Semiannually	X									
Millstone Station:													
Sediment	5	Quarterly	Quarterly	X		X							
Shellfish	2	Semiannually	Semiannually	X		X							
Fodder	3	Semiannually	Semiannually	X									
Nuclear submarine facilities in New London Harbor:													
Sediment	7	2/quarter	2/quarter	X		X							

Table 1. Summary of State environmental surveillance programs, 1972—continued

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis									
				γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
CONNECTICUT—continued													
Water:													
General:													
Reservoir, public supply	6	3/year	3/year	------	X	X							
River water	7	Quarterly	Quarterly	------	X	X							^{3}H
	14	Quarterly	Quarterly	----------		X							
Sea water	1	Quarterly	Quarterly	----------		X							^{3}H
Source oriented:													
Haddam Neck:													
Reservoir, public supply	6	3/year	3/year	------	X	X							
River water	6	Monthly	Monthly	X	X	X							^{3}H
Well water	4	Quarterly	Quarterly	------	X	X							^{3}H
Millstone Station:													
Reservoir, public supply	3	3/year	3/year	------	X	X							
Sea water	6	Quarterly	Quarterly	(c)		X							^{3}H
Well water	1	Quarterly	Quarterly	------	X	X							^{3}H
Nuclear submarine facilities in New London Harbor:													
Sea water	7	2/Quarter	2/Quarter	(d)		X							^{3}H
United Nuclear Corporation:													
Reservoir, public supply	2	3/year	3/year	------	X	X							
River water	1	Quarterly	Quarterly	----------		X							
Combustion Engineering and S1C Prototype Reactor:													
River water	2	Quarterly	Quarterly	------	X	X							^{3}H

[a] Pasteurized milk is collected monthly from several distributors and then combined as a composite sample representative of milk sold in the central area of the State.

[b] Raw milk from farm.
[c] Gamma spectrum on sample from Millstone quarry outfall.
[d] Gamma spectrum on sample from Electric Boat Div. rad. waste facility.

DELAWARE

Pop: 548,100
Area: : 2,057 mi²

Air	0												
Milk:													
General	3	Monthly	Monthly									X	
Source oriented	0												
Miscellaneous:													
General:													
Sediment	14	Monthly	Monthly	------	X	X							
Biota	14	Monthly	Monthly	------	X	X							
Source oriented	0												
Water:													
General:													
Surface	14	Monthly	Monthly	------	X	X							
Ground	6	Annually	Annually	------	X	X						X	^{226}Ra
Source oriented	0												

DISTRICT OF COLUMBIA

Pop: 756,500
Area: 67 mi²

Air:													
General	1	Daily	Daily	----------		X							
Source oriented	0												
Milk	0												
Miscellaneous	0	As needed											
Water:													
General													
Surface	1	Daily	Daily	------	X	X							
Public supply	2	Daily	Daily	------	X	X							
Sewage influent	1	Daily	Weekly	------	X	X							
Source oriented	0												

Table 1. Summary of State environmental surveillance programs, 1972—continued

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis									
				γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
FLORIDA													
Population: 6,789,400 Area: 58,560 mi²													
Air:													
General:	2	3/week	3/week	------	X	X	----------						(a)
Source oriented:													
Turkey Point	8	Weekly	Weekly	(b)	------	X	X	----------					(a)
Crystal River	5	Weekly	Weekly	(b)	------	X	X	----------					(a)
Cape Kennedy	1	3/week	3/week	----------		X	----------						(a)
Hutchinson Island	8	Weekly	Weekly	(b)	----------		X						
Milk:													
General:													
Raw	6	Monthly	Monthly	----------			X	X	X	X	X	X	
Source oriented:													
Crystal River:													
Raw	1	Quarterly	Quarterly	----------			X	X	X	X	X	X	
Hutchinson Island:													
Raw	6	Quarterly	Quarterly	----------			X	X	X	X	X	X	
Miscellaneous:													
Source oriented:													
Turkey Point:													
Biota	17	Quarterly	Quarterly	X	----------							X	
Sargassum	8	Semiannually	Semiannually	X	----------							X	
Mangrove	7	Quarterly	Quarterly	X	----------							X	
Algae fresh water	3	Semiannually	Semiannually	X	----------							X	
Turtle grass	7	Semiannually	Semiannually	X	----------							X	
External radiation (TLD)	11	Monthly	Monthly	----------									(c)
External radiation (Victoreen Ion Chamber)	8	Monthly	Monthly	----------									(c)
Soil	11	Semiannually	Semiannually	X	----------							X	
Silt	17	Quarterly	Quarterly	X	----------							X	
Small animal	1	Semiannually	Semiannually	X	----------							X	
Food crops	5	Semiannually	Semiannually	X	----------							X	
Crystal River:													
Oysters	7	Quarterly	Quarterly	X	------	X	----------					X	^{32}P
Crabs	1	Quarterly	Quarterly	X	------	X	----------					X	^{32}P
Soil	10	Semiannually	Semiannually	X	------	X							
Silt	4	Quarterly	Quarterly	X	------	X							
Citrus	1	Quarterly	Quarterly	X	------	X	----------					X	
Vegetation	10	Monthly	Monthly	X	------	X							
External radiation (TLD)	5	Monthly	Monthly	----------									(c)
Hutchinson Island:													
External radiation (TLD)	8	Monthly	Monthly	----------									(c)
Silt	7	Semiannually	Semiannually	X	----------							X	
Soil	8	Semiannually	Semiannually	X	----------							X	
Crustacea	9	Quarterly	Quarterly	X	----------							X	
Fish	9	Quarterly	Quarterly	X	----------							X	
Fresh water plants	2	Semiannually	Semiannually	X	----------							X	
Food crops	6	Semiannually	Semiannually	X	----------							X	
Water:													
General:													
Precipitation	2	3/month	3/month	----------		X							
Source oriented:													
Turkey Point:													
Bay water	11	Monthly	Monthly	X	----------							X	(d)
Surface (canal)	3	Quarterly	Quarterly	X	------	X	----------						(d)
Public supply	3	Quarterly	Quarterly	----------		X	----------						^{3}H
Ground	2	Quarterly	Quarterly	----------		X	----------						^{3}H
Precipitation	4	Monthly	Monthly	----------		X	----------						^{3}H
Crystal River:													
Sea water	2	Quarterly	Quarterly	----------		X	----------						(d)
Sea water	4	Quarterly	Quarterly	X	------	X	----------						(d)
Public supply	4	Quarterly	Quarterly	X	------	X	----------						^{3}H
Surface	4	Quarterly	Quarterly	X	------	X	----------						^{3}H
Potable ground	1	Quarterly	Quarterly	X	------	X	----------						^{3}H
Ground	1	Quarterly	Quarterly	X	------	X	----------						^{3}H
Hutchinson Island:													
Sea water	9	Quarterly	Quarterly	X	----------							X	^{3}H
Surface water	3	Quarterly	Quarterly	X	------	X	----------						^{3}H
Public supply	4	Quarterly	Quarterly	X	------	X	----------						^{3}H
Precipitation	4	Monthly	Monthly	X	------	X	----------						^{3}H

[a] Specific nuclides if necessary.
[b] Monthly composite.
[c] Direct radiation.
[d] ^{3}H, ^{58}Co, ^{60}Co.

Table 1. Summary of State environmental surveillance programs, 1972—continued

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis									
				γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
GEORGIA													
Population 4,589,600 Area: 58,876 mi²													
Air:													
General	3	3/day	Daily			X							
Source oriented:													
Georgia Tech Reactor	2	2/week	2/week		X	X							
Milk—Program on standby since 1964													
Miscellaneous	0												
Water:													
General	0												
Source oriented:													
Lockheed Radiation Effects Reactor:													
Surface	6	Weekly	Weekly		X	X							(a)

[a] ^{60}Co, ^{54}Mn, ^{56}Mn, ^{24}Na, ^{51}Cr.

HAWAII													
Population: 769,900 Area: 6,450 mi²													
Air:													
General	3	5/week	5/week			X							
Source oriented	0												
Milk:													
General	3	Annually [a]	Annually [a]				X	X	X			X	
Source oriented	0												
Miscellaneous	0												
Water:													
General:													
Ground, public supply	20	Annually	Annually			X	X	X				(b)	
Surface, public supply	15	Annually	Annually			X	X	X				(b)	
Source oriented	0												

[a] Frequency is increased during atmospheric tests.
[b] Strontium-90 analysis is done only when gross beta indicates probability of the radionuclide being present.

IDAHO													
Population: 713,000 Area: 83,557 mi²													
Air:													
General	4	Standby [a]	Standby [a]	X	X	X	X						
Source oriented	0												
Milk:													
General	3	Standby [a]	Standby [a]				X	X	X	X	X	X	
Source oriented	0												
Miscellaneous	0												
Water	0												

[a] All standby stations can be activated within a few hours' notice.

Table 1. Summary of State environmental surveillance programs, 1972—continued

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis									
				γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
ILLINOIS													
Population: 11,114,000 Area: 56,400 mi²													
Air:													
General	2	Daily	Daily	------	X	X							
Source oriented:													
Dresden	1	Daily	Daily	------	X	X							
Milk-on standby[a]													
Miscellaneous:													
General:													
External radiation (TLD)	11	Quarterly	Quarterly	----------									[b]
Source oriented:													
Quad-Cities:													
External radiation (TLD)	8	Quarterly	Quarterly	----------									[b]
Zion:													
External radiation (TLD)	7	Quarterly	Quarterly	----------									[b]
Dresden:													
External radiation (TLD)	17	Quarterly	Quarterly	----------									[b]
Water:													
General	0												
Source oriented:													
Sheffield Burial Site:													
Ground and surface	11	Quarterly	Quarterly	------	X	X	------	[c]	----------				[c]
Quad-Cities:													
Surface	5	Quarterly	Quarterly	------	X	X							
Ground	6	Quarterly	Quarterly	------	X	X							
Dresden:													
Surface	16	Quarterly	Quarterly	------	X	X							
Ground	12	Quarterly	Quarterly	------	X	X							
Zion:													
Surface	2	Quarterly	Quarterly	------	X	X							
INDIANA													
Population: 5, 193,700 Area: 36,291 mi²													
Air	0												
Milk:													
General	5	Monthly	Monthly	----------			X	X	X	X	X	X	
Source oriented	0												
Miscellaneous	0												
Water:													
General:													
Surface	16	Monthly	Monthly	------	X	X							
Source oriented	0												
IOWA													
Population 2,825,000 Area: 56,290 mi²													
Air:													
General	15	Varies	Quarterly	----------		X							
Source oriented	0												
Milk:													
General	2	Monthly	Monthly	----------			X	X	X	X		X	
	1	3–5/month	3–5/month	----------			X	X	X	X		X	
Source oriented	0												
Miscellaneous	0												
Water:													
General:													
Surface	19	Monthly	Monthly	------	X	X	----------						^{3}H
Precipitation	2	As available	As collected	------	X	X	----------						^{3}H
Drinking water supplies	1,098	Annually	On demand	------	X	X	[d]	[d]	----------			[d]	
Source oriented	0												

[a] Reactor oriented milk surveillance will be initiated for Dresden, Quad Cities, and Zion. These samples will be collected on a semiannual basis initially.

[b] Direct radiation (noble gases).

[c] Specific analysis if gross beta >50 pCi/liter.

[d] Selected sites.

Table 1. Summary of State environmental surveillance programs, 1972—continued

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis									
				γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
KANSAS													
Population: 2,249,100 Area: 82,264 mi²													
Air:													
General	1	Daily	Daily			X							^{222}Rn, ^{230}Th
Source oriented	0												
Milk:													
General													
Pasteurized	6	Monthly	Monthly				X	X	X	X			
Source oriented:													
Cooper Nuclear Station:													
Raw	1	Every other month	Every other month				X	X	X	X			
Miscellaneous:													
General:													
Soil and vegetation	4	Semiannually	Semiannually		X	X		X		X		X	^{106}Ru
External radiation (TLD)	7	1/quarter	1/quarter	X									
Source oriented:													
Research reactors, hospitals, Coleman Co.:													
Effluent studies	4	1/quarter	1/quarter		X	X	X						^{227}Th, ^{99m}Tc
Water:													
General:													
Surface	28	Monthly	Monthly		X	X		X				X	^{3}H, ^{226}Ra
Ground	30	Yearly	Yearly		X	X		X				X	^{3}H, ^{226}Ra
Precipitation	7	1/quarter	1/quarter		X	X		X				X	^{3}H
Source oriented	0												
KENTUCKY													
Population: 3,219,300 Area: 40,395 mi²													
Air	0												
Milk:													
General	7	Quarterly	Quarterly				X	X	X	X	X	X	
Source oriented	0												
Water:[a]													
General:													
Surface	12	Monthly	Monthly		X	X							
Source oriented:													
Nuclear Engr. Corp. Morehead:													
Ground	18	Monthly	Monthly	X	X	X							^{226}Ra [b]
Gaseous diffusion plant:													
Surface	6	Annually	Annually		X	X							
Miscellaneous:													
General:													
Dustfall	24	Monthly	Monthly		X	X							
Source oriented:													
Nuclear Engr. Corp.:													
Vegetation	10	1/2 year	1/2 year	X	X	X							
Silt	10	1/2 year	1/2 year	X	X	X							
Gaseous diffusion plant:													
Silt-vegetation	6	Annually	Annually		X	X							

[a] The State is conducting a survey of all public water supplies to establish the natural radioactivity of the respective areas. The public supplies are analyzed for gross alpha and beta. This is not a routine study, and therefore, will not be repeated.

[b] Analyses done on samples collected at four sampling locations around radioactive burial grounds.

Table 1. Summary of State environmental surveillance programs, 1972—continued

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis								
				γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
LOUISIANA													
Population: 3,643,200 Area: 48,523 mi²													
Air	3	5/week	5/week	----------		X							
Milk:													
General	7	7/month	7/month	----------			X	X	X	X	-------	X	
Source oriented	0												
Miscellaneous:													
General:													
Farm produce	5	Annually (season)	Annually (season)	X	X	X	X	X	X	X	----------		(a)
Source oriented	0												
Water:													
General:													
Surface	17	Monthly	Monthly	-------	X	X							
Public supply	2	Monthly	Monthly	-------	X	X							
Precipitation	3	Monthly	Monthly	-------	X	X							
Source oriented	0												

[a] ^{106}Ru, ^{95}Zr, ^{65}Zn, ^{144}Ce, ^{54}Mn.

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis								
				γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
MAINE													
Population: 993,700 Area: 33,215 mi²													
Air:													
General	1	Daily	Daily	X	X	X							
Source oriented:													
Maine Yankee	1	Weekly	Weekly	----------		X							
Milk:													
General	0												
Source oriented:													
Maine Yankee	1	Monthly	Monthly	X	----------		X	X	X	X	X	X	
Miscellaneous:													
General	0												
Source oriented:													
Maine Yankee:													
External radiation (TLD)	14	13 weeks	13 weeks	----------									(a)
Seaweed	8	Monthly	Monthly	X									
Sediment	3	13 weeks	13 weeks	X									
Shellfish	2	13 weeks	13 weeks	X									
Vegetables, hay, grass, apples	1	In season	In season	X									
Water:													
General:													
Precipitation	1	Daily	Daily	X	-------	X							
Ground (private wells)	6	Monthly	Monthly	X	-------	X	----------						(b)
Source oriented:													
Maine Yankee:													
Surface, salt water	9	Weekly	Weekly	X									
Surface, public supply	4	Weekly	Weekly	X	-------	X							

[a] Direct radiation (3 chips/station).

[b] ^{222}Rn and daughters.

Table 1. Summary of State environmental surveillance programs, 1972—continued

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis									
				γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
MARYLAND													
Population: 3,922,400													
Area: 10,577 mi²													
Air:													
General	14/1 [a]	Weekly	Weekly			X							
Source oriented	3 [a]	Weekly	Weekly			X							
Milk:													
General	1	Weekly	Weekly				X	X	X	X	X	X	
Source oriented	0												
Miscellaneous:													
General:													
Shellfish	4	Random	Random								X	X	
Source oriented	0												
Water:													
General:													
Precipitation	1	As collected	As collected			X							
Surface	3	Quarterly	Quarterly			X							^{3}H
Public supply	2	Monthly	Monthly		X	X							^{3}H
Public supply	1	Weekly	Weekly		X	X							^{3}H
Source oriented:													
Calvert Cliffs:													
Chesapeake Bay surface and bottom	5	Quarterly	Quarterly			X							^{3}H
Ground water	10	Quarterly	Quarterly		X	X							^{3}H
Surface stream	2	Quarterly	Quarterly		X	X							^{3}H

[a] 14 intermittent and 4 continuous.

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis									
				γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
MASSACHUSETTS													
Population: 5,689,200													
Area: 8,257 mi²													
Air:													
General	40	Weekly	Weekly			X							
	5	5/week	Daily			X							
	3	5/week	Weekly			X							
	2	Weekly	Weekly	X		X	(a)						^{3}H
	1	Weekly	Weekly	X		X	X						^{3}H
	1	Weekly	Weekly	X		X							
Source oriented	0												
Milk:													
General	1	Weekly	Weekly				X	X	X	X		MC	
Source oriented	0												
Miscellaneous:													
General:													
Shellfish	1	Quarterly	Quarterly			X							
Cranberries	1	2/year	2/year			X							
Source oriented	0												
Water:													
General:													
Ground, surface	1001	Quarterly	Quarterly		X	X							
Source oriented:													
Yankee:													
Surface	9	Monthly	Monthly			X							^{3}H (b)
Reactor waste	1	Monthly	Monthly			X							^{3}H
Reactor waste	1	Before discharge	Before discharge			X							
Lowell Technical Reactor:													
Surface	2	Monthly	Monthly			X							
MIT reactor:													
Reactor waste	1	Before discharge	Before discharge			X							
U.S. Army Materials Testing Reactor:													
Reactor waste	1	Before discharge	Before discharge			X							
Vermont Yankee:													
Surface (top & bottom)	4	Monthly	Monthly			X	X	X	X			X	^{3}H

[a] Initiated after an atmospheric detonation of a nuclear device. [b] ^{3}H 2/year. MC, monthly composite.

Table 1. Summary of State environmental surveillance programs, 1972—continued

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis								
				γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
MICHIGAN													
Population: 8,875,100 Area: 58,216 mi²													
Air:													
General	1	Daily	Daily			X							
Source oriented:													
Palisades Reactor	4	Weekly, continuous	Weekly			X	(a)						
Enrico Fermi	4	Weekly, continuous	Weekly			X	(a)						
Big Rock Point	5	Weekly, continuous	Weekly			X	(a)						
Donald C. Cook Reactor	1	Weekly, continuous	Weekly			X	(a)						
Background	1	Weekly, continuous	Weekly			X	(a)						
Milk:													
General:													
Pasteurized	3	Biweekly	Biweekly				X	X	X	X		(b)	
	2	Monthly	Monthly				X	X	X	X		(b)	
Source oriented:													
Big Rock Point and Palisades:													
Pasteurized	2	Weekly	Weekly				X	X	X	X		(b)	
Enrico Fermi:													
Pasteurized	1	Biweekly	Biweekly				X	X	X	X		(b)	
Miscellaneous:													
General	0												
Source oriented:													
Palisades Reactor:													
External radiation (film badge-TLD)	4	Monthly	Monthly										(c)
Aquatic biota	5	Semiannually	Semiannually	X		X							
Big Rock Point:													
External radiation (film badge-TLD)	6	Monthly	Monthly										(c)
Aquatic biota	5	Semiannually	Semiannually	X		X							
Enrico Fermi:													
External radiation (film badge-TLD)	4	Monthly	Monthly										(c)
Aquatic biota	5	Semiannually	Semiannually	X		X							
Donald C. Cook Reactor:													
External radiation (film badge-TLD)	1	Monthly	Monthly										(c)
Background:													
External radiation (film badge-TLD)	1	Monthly	Monthly										(c)
Water:													
General:													
Surface, public supply	37	Alternate 3-month periods	(d)	X	X	X							
Surface, public supply	11	Quarterly	(d)	X	X	X							
Surface, river	45	Quarterly	Quarterly			X							
Source oriented:													
Palisades Reactor:													
Precipitation	4	Weekly, continuous	Weekly			X							
Surface	5	Monthly	Monthly	X		X							^{3}H
Enrico Fermi:													
Precipitation	4	Weekly, continuous	Weekly			X							
Surface	5	Monthly	Monthly	X		X							^{3}H
Big Rock Point:													
Precipitation	5	Weekly, continuous	Weekly			X							
Surface	5	Monthly	Monthly	X		X							^{3}H
Donald C. Cook Reactor:													
Precipitation	1	Weekly, continuous	Weekly			X							
Reactor oriented	1	Weekly, continuous	Weekly			X							

[a] Gross gamma analysis for ^{131}I involves using charcoal filter adsorption.
[b] A minimum of once/month for each site.
[c] Direct gamma radiation.
[d] Quarterly composite of daily samples.

Table 1. Summary of State environmental surveillance programs, 1972—continued

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis								
				γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
MINNESOTA													
Population: 3,805,100													
Area: 84,068 mi²													
Air:													
General	1	Daily	Daily			X							
Source oriented:													
Monticello	8	Weekly	Weekly	(a)	X	X	X						
Prairie Island	9	Biweekly	Biweekly	(a)	------	X	(b)						
Milk:													
General:													
Pasteurized	8	Monthly	Monthly	------	------	------	X	X	------	------	------	X	
Source oriented:													
Monticello:													
Raw	12	Monthly	Monthly	------	------	------	X	X	------	------	------	X	
Prairie Island:													
Raw	9	Monthly	Monthly	------	------	------	X	X	------	------	------	X	
Elk River:													
Raw	4	Quarterly	Quarterly	------	------	------	X	X	------	------	------	X	
Miscellaneous:													
General:													
Fallout (pot)	1	Monthly	Monthly	X	------	X	X	------	------	------	------	X	^{3}H
Source oriented:													
Monticello:													
Aquatic insects	8	Quarterly	Quarterly	X	------	X	(c)	X	------	------	------	X	
Aquatic vegetation	8	Quarterly	Quarterly	X	------	X	------	X	------	------	------	X	
Plankton, algae or insects	8	Quarterly	Quarterly	X	------	X	(c)	X	------	------	------	X	
Bottom sediment	8	2/year	2/year	X	------	X	------	X	------	------	------	X	
External radiation (TLD and film badge)	40	Monthly	Monthly	------	------	------	------	------	------	------	------	------	(d)
Top soil field composite	6	2/year	2/year	X	------	X	------	X	------	------	------	X	
Vegetation	3	2/year	2/year	X	------	X	X	------	------	------	------	------	
Potatoes and soybeans	3	Annually	Annually	X	------	X	X	X	------	------	------	X	
Fish	2	Quarterly	Quarterly	X	------	X	------	------	------	X	------	(e)	
Clams	2	Quarterly	Quarterly	X	------	X	------	------	------	------	------	------	
Fallout (pot)	1	Monthly	Monthly	X	------	X	X	------	------	------	------	X	^{3}H
Prairie Island:													
External radiation (TLD and film badge)	9	Monthly	Monthly	------	------	------	------	------	------	------	------	------	(d)
	6	Every 4 weeks	Every 4 weeks	------	------	------	------	------	------	------	------	------	(d)
Bottom sediment	5	2/year	2/year	X	------	X	------	------	------	------	------	X	
Plankton, algae, or insects	5	Annually	Annually	X	------	X	(c)	------	------	------	------	X	
Agricultural crops	3	Annually	Annually	X	------	X	X	------	------	------	------	X	
Forage	3	2/year	2/year	X	------	X	X	------	------	------	------	------	
Top soil, field composite	3	2/year	2/year	X	------	X	------	------	------	------	------	X	
Fallout (pot)	1	2/year	2/year	X	------	X	------	------	------	------	------	X	
Aquatic vegetation	5	2/year	2/year	X	------	X	------	------	------	------	------	X	
Fish	2	4/year	4/year	X	------	X	------	------	------	------	------	X	
Clams	2	Quarterly	Quarterly	X	------	X	------	------	------	------	------	X	
Water:													
General:													
Surface and public supply	5	Weekly	Monthly composite	------	X	X	------	------	------	------	------	------	^{3}H every 6 months
Surface and public supply	3	Monthly	Monthly	------	X	X	------	------	------	------	------	------	
Surface and public supply	1	Weekly	Weekly	------	X	X	------	------	------	------	------	------	
Surface	1	Monthly	Monthly	X	------	X	------	------	------	------	------	X	^{3}H
	10	Monthly	Monthly	------	------	------	------	------	------	------	------	------	^{3}H
Precipitation		Daily	Daily	------	X	X	------	------	------	------	------	------	
Source oriented:													
Monticello:													
Surface	2	Daily	Weekly composite	(b)	------	X	------	------	------	------	------	(b)	^{3}H monthly
	1	Weekly	Weekly	(b)	------	X	------	------	------	------	------	(b)	^{3}H monthly
	6	Monthly	Monthly	X	------	X	------	------	------	------	------	X	^{3}H
Ground	4	Quarterly	Quarterly	------	X	X	------	------	------	------	------	X	^{3}H
	2	Monthly	Monthly	------	X	X	------	------	------	------	------	X	^{3}H
Prairie Island:													
Surface	2	Weekly	Weekly	X	------	X	------	------	------	------	------	(f)	^{3}H monthly
	2	Quarterly	Quarterly	X	------	X	------	------	------	------	------	X	^{3}H
	1	Monthly	Monthly	X	------	X	------	------	------	------	------	(f)	^{3}H monthly
Ground	9	Quarterly	Quarterly	X	X	X	------	------	------	------	------	X	^{3}H

[a] Gamma scan done on monthly composite of all weekly samples.
[b] Monthly.
[c] ^{131}I analysis will be performed once before plant startup and yearly during operational period. If ^{131}I is higher than expected, quarterly analyses will be undertaken on insect samples.
[d] Gamma-TLD; Beta-gamma—Film Badge.
[e] ^{90}Sr determined in both fish flesh and skeleton.
[f] ^{90}Sr is analyzed quarterly.

Table 1. Summary of State environmental surveillance programs, 1972—continued

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis								
				γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
MISSISSIPPI													
Population: 2,216,900 Area: 47,716 mi²													
Air	0												
Milk	0												
Miscellaneous	0												
Water	0												
MISSOURI													
Population: 4,677,400 Area: 69,686 mi²													
Air	0												
Milk	0												
Miscellaneous	0												
Water:													
General:													
Surface, public supply	14	Monthly	Monthly		X	X							
Surface, public supply	10	6/year	6/year			X						X	^{226}Ra
Ground, public supply	10	Monthly	Monthly		X	X							
Ground, public supply	4	6/year	6/year			X						X	^{226}Ra
Ground & surface, public supply	1	Monthly	Monthly		X	X							
Source oriented	0												
MONTANA													
Population: 694,400 Area: 147,138 mi²													
Air	0												
Milk	0												
Miscellaneous	0												
Water	0												
NEBRASKA													
Population 1,483,800 Area: 77,227 mi²													
Air	0												
Milk	0												
Miscellaneous	0												
Water:													
General:													
Precipitation	1	As available	As collected		X	X							
Source oriented:													
Hallam Nuclear Power Facility:													
Surface	2	Semiannually	Semiannually			(a)							
Ground	9	Semiannually	Semiannually			(a)							

[a] Those individual samples showing high beta-gamma results are given a gamma spectrum analysis to ascertain the contributor. A composite of all semiannual samples is given a gamma spectrum analysis to determine the gross gamma activity.

Table 1. Summary of State environmental surveillance programs, 1972—continued

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis								
				γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
NEVADA													
Population: 488,700 Area: 110,640 mi²													
Air	0												
Milk	0												
Miscellaneous	0												
Water	0												
NEW HAMPSHIRE													
Population: 737,700 Area: 9,304 mi²													
Air:													
General	0												
Source oriented:													
Vermont Yankee	6	Weekly	Weekly	(a)	------	X							
Milk:													
General	0												
Source oriented:													
Vermont Yankee	3	Monthly	Monthly	X	----------							X	
Miscellaneous:													
General	0												
Source oriented:													
Vermont Yankee:													
Vegetation	(b)	Annually	Annually	X	------	X							
Pasturage and fodder crops	3	Semiannually	Semiannually	X	------	X	----------					X	
Diet	2	Semiannually	Semiannually	X	------	X	----------					X	
Soil	4	Semiannually	Semiannually	X	------	X	----------					X	
Silt and benthic organisms	2	Semiannually	Semiannually	X	------	X	----------					X	
Fish and shellfish	2	Semiannually	Semiannually	X	------	X	----------					X	
External radiation (TLD)	7	Quarterly	Quarterly	----------									(c)
Water:													
General	0												
Source oriented:													
Vermont Yankee:													
Drinking water	1	Semiannually	Semiannually	X	------	X	----------					X	
Ground water	1	Quarterly	Quarterly	X	------	X	----------					X	
Precipitation	2	Continuous	Quarterly	X	------	X	----------					X	
NEW JERSEY													
Population: 7,168,200 Area: 7,836 mi²													
Air:													
General	1	Continuous	Weekly	X	------	X							
Source oriented:													
Oyster Creek	7	Continuous	Biweekly	X	------	W	W	----------			Q	Q	
Air particulates—stack	1	Quarterly	Quarterly	X	------	X							
Gaseous discharges—stack	1	Quarterly	Quarterly	X									
Salem	2	Continuous	Biweekly	X	------	W	W	----------			Q	Q	
Milk:													
General	2	Monthly	Monthly	----------			X	X	X	X	X	X	
Source oriented:													
Salem	3	Quarterly	Quarterly	----------			X	X	X	X	X	X	
Miscellaneous:													
General	0												
Source oriented:													
Oyster Creek:													
Silt	7	Semiannually	Semiannually	X									
	8	Annually	Annually	X									
Benthic algae	8	Semiannually	Semiannually	X									
Fin fish and crabs	2	Semiannually	Semiannually	X	----------						X	X	
Clams	6	Quarterly	Quarterly	X	----------						X	X	
Food produce	6	Annually	Annually	X	----------						X	X	
Wildlife	2	Annually	Annually	X									
External radiation (TLD)	12	Quarterly	Quarterly										

[a] Composite for gamma scan quarterly.

[b] One each of principal agricultural crops and fruit within 10-mile radius of site within New Hampshire. One each of same principal crops and fruit from vicinity of Concord, New Hampshire.

[c] Gamma dose quarterly.

See footnotes at end of table.

Table 1. Summary of State environmental surveillance programs, 1972—continued

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis									
				γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
NEW JERSEY—continued													
Salem:													
Silt	5	Annually	Annually	X									
Food produce	4	Annually	Annually	X							X	X	
External radiation (TLD)	5	Quarterly	Quarterly										
Water:													
General:													
Statewide	20	Annually	Annually	------	X	X					X	X	
Potable	21	Annually	Annually	------	X	X					(a)	(a)	(b)
Source oriented:													
Oyster Creek:													
Surface water	1	Continuous	Weekly	X							X	X	^{3}H
	2	Monthly	Monthly	X							X	X	^{3}H
Potable water	11	Semiannually	Semiannually	------	X	X					(a)	(a)	(b)
Aqueous discharges—inhouse	1	Quarterly	Quarterly	X							X	X	^{3}H
Salem:													
Surface water	2	Monthly	Monthly	X							X	X	^{3}H
	7	Semiannually	Semiannually	X							X	X	^{3}H
Potable water	5	Quarterly	Quarterly	------	X	X					(a)	(a)	(b)

[a] If gross beta concentration exceeds permissible ^{90}Sr level.
[b] Analysis for ^{226}Ra if gross alpha concentration exceeds permissible ^{226}Ra level.
W, Weekly.
Q, Quarterly.

NEW MEXICO

Population: 1,016,000
Area: 121,666 mi²

Air	0				
Milk	0				
Miscellaneous	0				
Water:					
General:					
Surface	10	Varies	Varies [a]		^{3}H
Source oriented	0				

[a] Analysis conducted by National Environmental Research Center, Las Vegas, Nevada.

NEW YORK

Population: 18,190,700
Area: 49,576 mi²

Air													
General	1	Weekly	Weekly		X								^{85}Kr
Source oriented:													
Consolidated Edison	2	Weekly	Weekly		X								
Nine Mile Point	1	Weekly	Weekly		X								
R. E. Ginna	1	Weekly	Weekly		X								
Nuclear Fuel Services[a]	5	Weekly	Weekly		X								
	5	Weekly	(c)										(b)
	5	(c)	(c)										(b)
	5	Weekly	Weekly										(d)
Cornell University	1	Weekly	Weekly		X								
United Nuclear	1	Weekly	Weekly		X								
Union Carbide	1	Weekly	Weekly		X								
Milk:													
General	1	Weekly	Weekly	X		X	X	X		(e)	X		(f)
	2	2/month	2/month	X		X	X	X		(e)	X		(f)
	2	Monthly	Monthly	X		X	X	X		X	X		(f)
Source oriented:													(f)
Consolidated Edison	1	Monthly	Monthly	X		X	X	X			X		$^{3}H(HTO)$ [g]
Nine Mile Point	4	Monthly	Monthly	X		X	X	X			X		$^{3}H(HTO)$ [g]
R. E. Ginna	3	Monthly	Monthly	X		X	X	X			X		$^{3}H(HTO)$ [g]
Nuclear Fuel Services[b]	12	Monthly	Monthly	X		X	X	X		X			(f) (g)
	1	Weekly	Weekly	(i)		X	X	X		(i)			(f) (i)
	8	1/2 months	1/2 months				X	X					^{129}I
Union Carbide	1	2/month	2/month	X		X	X	X			X		(f)
	1	Planned	Planned										
Brookhaven	3	Monthly	Monthly	X		X	X	X			X		$^{3}H(HTO)$ [g]
Miscellaneous:													
General:													
Fish	1	Semiannually	Semiannually	X			X	X			(f)		(f)
Fallout	1	Weekly	Weekly	X			X	X			X		$^{3}H(HTO)$ [g]

See footnotes at end of table.

Table 1. Summary of State environmental surveillance programs, 1972—continued

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis								
				γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
NEW YORK—continued													
Source oriented:													
Consolidated Edison:													
Algae or vegetation	5	Semiannually	Semiannually	X				X	X				(f)
Fish	4	Semiannually	Semiannually	X				X	X			X	(f)
Bottom sediments	4	Semiannually	Semiannually	X				X	X				Pu, IU, f
R. E. Ginna:													
Algae or vegetation	2	Semiannually	Semiannually	X				X	X				(f)
Fish	1	Semiannually	Semiannually	X				X	X			X	(f)
Bottom sediments	2	Semiannually	Semiannually	X				X	X				Pu, IU, f
Crops	(a)	Semiannually	Semiannually	X				X	X				(f)
Nine Mile Point:													
Algae or vegetation	2	Semiannually	Semiannually	X				X	X				(f)
Fish	1	Semiannually	Semiannually	X				X	X			X	(f)
Bottom sediments	2	Semiannually	Semiannually	X				X	X				Pu, IU, f
Crops	(a)	Semiannually	Semiannually	X				X	X				(f)
Shoreham:													
Fish	1	Semiannually	Semiannually	X				X	X			X	(f)
National Lead:													
Bottom Sediments	1	Semiannually	Semiannually	X				X	X			X	Pu, IU, f
Nuclear Fuel Services:													
Fish	7	Semiannually	Semiannually	X				X	X			X	(f)
Crops	(a)	Annually	Annually	X				X	X				(f)
Deer	(a)	Semiannually	Semiannually	X				X	X			X	(f) (i)
Small game	(a)	Continuous during summer	Continuous during summer	X				X	X				^{129}I, f
Fallout	1	Weekly	Weekly	X				X	X		X	X	^{3}H(HTO) f
Water:													
General:													
Public supply	1	Daily	Monthly composite			X							^{3}H(HTO)
Public supply—surface	1	Daily	Weekly composite			X							^{3}H(HTO) j
	2	Weekly	Weekly		X	X							^{3}H(HTO)
	1	Monthly	Monthly			X							
Surface	1	Daily	Weekly composite			X							
	2	Monthly	Monthly			X							^{3}H(HTO)
	2	Monthly	Monthly			X							
	3	2/Year	2/Year			X						X	
Source oriented:													
Consolidated Edison:													
Surface	1	Quarterly	Quarterly			X							
	2	Daily	Weekly composite	X		X		X	X			X	^{3}H(HTO) f, j
Public supply:													
Treated	2	Monthly	Monthly			X							
Raw	4	Monthly	Monthly			X							
Nine Mile Point:													
Surface	1	Monthly	Monthly			X							^{3}H(HTO)
Public	1	Continuous	Biweekly			X							^{3}H(HTO) m
R. E. Ginna:													
Surface	1	Continuous	Weekly composite			X	X						^{3}H(HTO)
Nuclear Fuel Services: n													
Surface	1	Daily	Daily	(o)		X		X	X			(o)	^{3}H(HTO) f
	1	Weekly	Weekly		X	X						X	^{129}I, ^{3}H (HTO)
	1	Weekly	Weekly	X	X	X		X	X			X	^{129}I, ^{3}H (HTO) f
	1	Weekly	Weekly			X						X	^{129}I, ^{3}H (HTO)
	1	Monthly	Monthly		X	X							^{3}H(HTO)
	1	Monthly	Monthly		X	X						X	^{3}H(HTO)
Public supply:													
Surface	10	Annually	Annually			X							^{3}H(HTO)
Cornell Burial Site:													
Surface	2	2/Year	2/Year			X							^{3}H(HTO)
Well	6	Annually	Annually			X							^{3}H(HTO)
Union Carbide:													
Surface	1	Monthly	Monthly			X	X						^{3}H(HTO)
Pawling													
Surface	1	Monthly	Monthly		X	X							
Knolls Atomic Power Laboratory:													
Surface	1	Monthly	Monthly			X							^{3}H(HTO)
National Lead:													
Surface	1	2/Year	2/Year		X	X							
Shoreham:													
Surface	2	2/Year	2/Year			X					X		^{3}H(HTO)
Brookhaven	1	Monthly	Monthly			X							^{3}H(HTO)

[a] Nuclear Fuel Services shut down for an indefinite period.
[b] Plutonium analysis done 13 times per year.
[c] Krypton-85 sample taken at one of the five air stations during a plant dissolution. Site is determined by wind direction.
[d] Iodine-129 by charcoal cartridge is planned.
[e] Strontium-89, iodine-129 and tritium(HTO)-12 analyses per year.
[f] Isotopic gamma normally includes ruthenium plus any other discernible photopeaks.
[g] Strontium-89—12 analyses per year.
[h] Schedule may be reduced until plant goes back into operation.
[i] Iodine-129, tritium—4 analyses per year.
[j] 12 analyses per year.
[k] Around vicinity of installation.
[l] Iodine-129, tritium, plutonium.
[m] 13 analyses per year.
[n] Isotopic gamma and strontium-90 done if gross beta is greater than 300 pCi/liter.
IU, Isotopic uranium.

Table 1. Summary of State environmental surveillance programs, 1972—continued

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis									
				γ scan	Gross		^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
					α	β							
NORTH CAROLINA													
Population: 5,082,100 Area: 52,586 mi²													
Air:													
General	1	Daily	Daily	(a)	------	X	(a)	(a)	(a)	(a)			(a,b)
	4	2/month	2/month	(a)	------	X	(a)	X	X	X	----------		(b)
Source oriented:													
Wm. B. McGuire Nuclear Station	1	2/month	2/month	(a)	------	X	(a)	X	X	X	----------		(b)
Milk:[d]													
General	6	Monthly	Monthly	----------			X	X	X	X	X	X	
Source oriented:													
Wm. B. McGuire Nuclear Station	1	Monthly	Monthly	----------			X	X	X	X	X	X	
Miscellaneous													
General:													
Shellfish	1	As available	As collected	X	X	X	X	X	X	X	X	X	(b,e)
Source oriented:													
Nuclear medicine in hospitals Sewage	4	Monthly	Monthly	X									
Water:[f]													
General													
Surface	10	Monthly	Monthly	------	(g)	(g)	----------						(h)
Public supply	10	Monthly	Monthly	------	X	X	----------						(i)
Source oriented:													
Brunswick Nuclear Power Plant: Surface	4	Monthly	Monthly	X	X	X							
Wm. B. McGuire Nuclear Station: Surface	2	Monthly	Monthly	X	X	X							

[a] Gamma analysis on each filter exhibiting high gross beta readings.
[b] ^{106}Ru, ^{144}Ce, ^{95}Zr-Nb, ^{65}Zn.
[c] Gamma analysis on at least 1 filter per month.
[d] These are composite samples representing the milk shed for the area.
[e] Upon completion of Brunswick Steam Electric Plant, a regular shellfish sampling program will begin.
[f] The State is carrying out a survey of all public ground water supplies
[g] Gross alpha and beta on suspended and dissolved solids from 5 samples/month. Both analyses done if gross alpha–beta on total solids is high.
[h] If gross beta >5 pCi/liter, gamma spectrum analysis for ^{144}Ce, ^{131}I, ^{106}Ru, ^{137}Cs, ^{95}Zr, ^{95}Nb, ^{54}Mn, ^{65}Zn, ^{40}K, ^{140}Ba; ^{140}La, and radiochemical analysis for ^{89}Sr and ^{90}Sr.
[i] Same as (h) except no radiochemical analysis performed for ^{89}Sr and ^{90}Sr.

NORTH DAKOTA													
Population: 617,800 Area: 70,665 mi²													
Air:													
General	9	30/year	30/year	----------		X							
	6	61/year	61/year	----------		X							
Source oriented	0												
Milk:													
General	6	Monthly	Monthly	----------			X	X	X	X	X	X	
Source oriented	0												
Miscellaneous	0												
Water	0												

Table 1. Summary of State environmental surveillance programs, 1972—continued

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis									
				γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
OHIO													
Population: 10,652,000 Area: 41,222 mi²													
Air	0												
Milk	0												
Miscellaneous	0												
Water:													
General:													
Surface	19	Monthly	Monthly	------	X	X							
Source oriented:													
Plum Brook Reactor:													
Surface	2	Monthly	Monthly	------	X	X							
Ground	1	Monthly	Monthly	------	X	X							
AEC-Feed Materials Production Center:													
Surface	1	Monthly	Monthly	------	X	X							
AEC Monsanto Research Corp:													
Surface	1	Monthly	Monthly	------	X	X							
Goodyear Atomic Corp.:													
Surface	2	Monthly	Monthly	------	X	X							
Battelle Mem. Institute Reactor:													
Surface	1	Monthly	Monthly	------	X	X							
OKLAHOMA													
Population: 2,559,300 Area: 69,919 mi²													
Air:													
General	97	10/month	Weekly	----------		X							
Source oriented	4	10/month	Monthly	----------		X							
Milk	0												
Miscellaneous	0												
Water:													
General:													
Ground, surface	597	Once every 3 years	Once every 3 years	------	X	X	----------						^{226}Ra
Surface	32	Monthly	Monthly	------	X	X	----------						^{226}Ra
Source oriented:													
Kerr-McGee facilities:													
Surface	11	Monthly	Monthly	------	X	X	----------						^{226}Ra
Fansteel facilities:													
Surface	3	Monthly	Monthly	------	X	X	----------						^{226}Ra
OREGON													
Population: 2,091,400 Area: 96,981 mi²													
Air:													
General	2	Weekly	Weekly	----------		X							
Source oriented:													
Trojan	3	Quarterly	Quarterly	----------		X							
Chem Nuclear (burial grounds)	1	Semiannually	Semiannually	----------		X							
Nevada Test Site	2	Daily	Daily	----------		X							
Milk:													
General	6	Monthly	Monthly	X	----------		X	X	X	X	------	(c)	
Source oriented:													
Trojan	2	Biweekly	Biweekly	X	----------		X	X	X	X	------	(c)	
	3	Quarterly	Quarterly	X	----------		X	X	X	X	------	(c)	
Oregon State University reactor	1	Bimonthly	Bimonthly	X	----------		X	X	X	X	------	(c)	
Miscellaneous:													
General:													
Sediment	12	Semiannually	Semiannually	X	----------			X	------	X	----------		(c)
	6	Annually	Annually	X	----------			X	------	X	----------		(c)
External radiation (TLD)	6	Semiannually	Semiannually	----------									(c)
Source oriented:													
Trojan:													
Sediment	4	Monthly	Monthly	X	----------			X	------	X	----------		^{65}Zn, [b]
Soil	8	Quarterly	Quarterly	X	----------			X	------	X	----------		(c)
Vegetation	8	Quarterly	Quarterly	X	----------		X	X	X	X	----------		(c)
Algae	2	Monthly when available	Monthly when available	X	----------			X	------	X	----------		^{65}Zn, [b]
	3	Semiannually	Semiannually	X	----------					X	----------		^{65}Zn, [b]
	2	Annually	Annually	X	----------					X	----------		^{65}Zn, [b]

Table 1. Summary of State environmental surveillance programs, 1972—continued

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis								
				γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
Oregon—continued													
Shellfish	4	Quarterly when available	Quarterly when available	X						X			^{65}Zn, [d]
	3	Semiannually	Semiannually	X						X			^{65}Zn, [d]
	2	Annually	Annually	X						X			^{65}Zn, [d]
Fish	2	Semiannually	Semiannually	X			X			X			(d)
	4	Annually	Annually	X			X			X			(d)
External radiation (TLD)	12	Quarterly	Quarterly										(e)
Chem Nuclear (burial grounds):													
Soil	3	Semiannually	Semiannually	X				X		X			(b)
Hanford:													
Algae	2	Quarterly when available	Quarterly when available	X				X		X			^{65}Zn, [b]
Natural activity study:													
Sediment [a]	12	Semiannually	Semiannually	X				X		X			(b)
	5	Annually	Annually	X				X		X			(b)
Water:													
General:													
Surface	21	Semiannually	Semiannually		X	X				X			^{3}H, [d]
	11	Annually	Annually	X	X	X				X			^{3}H, [d]
Precipitation	1	Daily when available	Daily when available			X							
	2	Monthly	Monthly	X	X	X				X			^{3}H, [d]
Interstate carriers	10	Annually	Annually	X	X	X				X			^{3}H, [d]
Source oriented:													
Trojan:													
Surface	4	Monthly	Monthly	X	X	X				X			^{65}Zn, ^{3}H, [d]
Ground	1	Quarterly	Quarterly	X	X	X				X			^{65}Zn, ^{3}H, [d]
Precipitation	3	Quarterly	Quarterly	X	X	X				X			^{3}H, [d]
Hanford:													
Surface	4	Quarterly	Quarterly	X	X	X				X			^{65}Zn, ^{3}H, [d]
Natural activity study:													
Ground	22	Semiannually	Semiannually	X	X	X				X			^{3}H, [d]

[a] Analyzed quarterly.
[b] $^{103,106}Ru$, ^{95}Zr-Nb, ^{60}Co.
[c] Integrated dose.
[d] $^{103,106}Ru$, ^{95}Zr-Nb.
[e] Natural activity study for radium, uranium and thorium.

PENNSYLVANIA

Population: 11,793,900
Area: 45,333 mi²

Air:													
General	0												
Source oriented:													
Peach Bottom:													
Onsite particulate filters	1	Quarterly	Quarterly		X	X						X	
Offsite particulate filters	1	Weekly	Weekly		X	X						X	
Three Mile Island:													
Offsite particulate filters	1	Weekly	Weekly		X	X						X	
Milk:													
General	4	Monthly	Monthly				X	X	X	X		X	
Source oriented:													
Peach Bottom	1	Quarterly	Quarterly	X			X	X	X	X		X	
Three Mile Island	1	Quarterly	Quarterly	X			X	X	X	X		X	
Miscellaneous:													
General	0												
Source oriented:													
Peach Bottom:													
External radiation (TLD)	6	Quarterly	Quarterly										Readout
Three Mile Island:													
External radiation (TLD)	6	Quarterly	Quarterly										Readout
Saxton Nuclear Reactor:													
External radiation (TLD)	6	Quarterly	Quarterly										Readout
Source oriented:													
NUMEC Uranium:													
Silt	1	Sporadic	Sporadic	X	X	X							U
Molybdenum Corp.:													
Slag	1	Sporadic	Sporadic	X	X	X							Th
Vitro Metals(uranium burials):													
Silt	1												U
Martin Marietta (SNAP Generator):													
Soil, bones, vegetation	1	Sporadic	Sporadic									X	

Table 1. Summary of State environmental surveillance programs, 1972—continued

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis									
				γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
PENNSYLVANIA—continued													
Water:													
General:													
Surface	30	Quarterly	Quarterly	------	X	X	------						^{3}H
Source oriented:													
Peachbottom:													
Onsite	2	Quarterly	Quarterly	X	X	X	X	X	------			X	^{3}H
Offsite	2	Monthly	Monthly	------	X	X	------						^{3}H
Three Mile Island:													
Onsite	1	Quarterly	Quarterly	------	X	X	------						^{3}H
Offsite	3	Monthly	Monthly	------	X	X	------						^{3}H
Saxton Nuclear Reactor:													
Onsite	2	Quarterly	Quarterly	X	X	X	X	X	------			X	^{3}H
Offsite	2	Monthly	Monthly	------	X	X	------						^{3}H
NUMEC Uranium:													
Surface	6	Quarterly	Quarterly	------	X	X							
Shippingport:													
Surface	2	Quarterly	Quarterly	------	X	X							
Westinghouse:													
Surface	6	Quarterly	Quarterly	------	X	X							
Bettis Labs:													
Surface	2	Quarterly	Quarterly	------	X	X							
PUERTO RICO													
Population: 2,689,900													
Area: 3,435 mi^2													
Air:													
General	0												
Source oriented:													
Reactor oriented	2	3/week	3/week	------		X							
Milk:													
General	0												
Source oriented:[a]													
Pasteurized	4	Weekly	Weekly	------			X	X	X	X	M	M	
Raw	4	Weekly	Weekly	------			X	X	X	X	M	M	
Miscellaneous:													
General	0												
Source oriented:													
Reactor source:													
Mixed leaves, sugar cane leaves	2	Weekly	Weekly	------		X	X	X	X	X	------		(b)
Water:													
General	0												
Source oriented:[a]													
Reactor oriented:													
Public supply	4	Monthly	Monthly	------		X	X	X	X	X	------		(b)
Precipitation	1	Monthly	Monthly	------		X	X	X	X	X	------		(b)

[a] Source and fallout oriented.

[b] ^{144}Ce, ^{106}Ru, ^{95}Zr, ^{65}Zn.

M, monthly.

Table 1. Summary of State environmental surveillance programs, 1972—continued

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis									
				γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
RHODE ISLAND													
Population: 949,700 Area: 1,214 mi²													
Air:													
General	0												
Source oriented:													
United Nuclear Corp.	2	Weekly	Weekly	------	X								
Nuclear Research Reactor	2	Weekly	Weekly	X	------	X	X	X	X	X	----------		(a)
Nuclear Submarine Base	2	Weekly	Weekly	X	------	X	X	X	X	X	----------		(a)
Milk	0												
Miscellaneous:													
General	0												
Source oriented:													
United Nuclear Corp.:													
Soil and vegetation	2	Sporadic	Sporadic	X	----------		X	X	X	X	----------		(b)
Nuclear Research Reactor:													
Soil and vegetation	2	Sporadic	Sporadic	X	----------		X	X	X	X	----------		(b)
Nuclear Submarine Provision Commissary:													
Soil and vegetation	2	Sporadic	Sporadic	X	----------		X	X	X	X	----------		(b)
Proposed Rome Point Nuclear Power Reactor:													
Soil and vegetation	2	Sporadic	Sporadic	X	----------		X	X	X	X	----------		(a)
Water:													
General	0												
Source oriented:													
United Nuclear Corp.:													
Surface	2	Monthly	Monthly	----------			X	X	X	X	----------		(b)
Nuclear Research Reactor:													
Surface	2	Monthly	Monthly	----------			X	X	X	X	----------		(b)
Nuclear Submarine Base:													
Surface	2	Monthly	Monthly	----------			X	X	X	X	----------		(b)
Proposed Rome Point Nuclear Power Reactor:													
Surface	2	Weekly	Weekly	----------			X	X	X	X	----------		(b)

a ^{144}Ce, ^{106}Ru, ^{54}Mn, ^{125}Sb, ^{65}Zn, ^{58}Co.

b ^{144}Ce, ^{106}Ru, ^{54}Mn, ^{95}Zr, ^{65}Zn, ^{60}Co.

Table 1. Summary of State environmental surveillance programs, 1972—continue

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis								
				γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
SOUTH CAROLINA													
Population: 2,590,500													
Area: 31,055 mi²													
Air:													
General	12	Weekly	Weekly	X	X	X							
Source oriented	3	Weekly	Weekly	X	X	X	X	----------				X	
Milk:													
General	0												
Source oriented:													
Allied-Gulf Nuclear Services	2	Quarterly	Quarterly	X	----------		X	X	X	X	X	X	
H.B. Robinson Nuclear Power Plant	3	Quarterly	Quarterly	X	----------		X	X	X	X	X	X	
Oconee Nuclear Station	3	Quarterly	Quarterly	X	----------		X	X	X	X	X	X	
Virgil C. Summer Nuclear Station	3	Quarterly	Quarterly	X	----------		X	X	X	X	X	X	
Miscellaneous:													
General	0												
Source oriented:													
H.B. Robinson Nuclear Power Plant:													
Soil	4	Quarterly	Quarterly	X									
Silt	2	Quarterly	Quarterly	------	X	X							
External radiation (TLD)	10	Quarterly	Quarterly	----------									[a]
Vegetation	4	Quarterly	Quarterly	X	X	X							
Marine life	2	Quarterly	Quarterly	X	X	X							
Westinghouse Fuel Fabrication Plant:													
Mud	1	Biannually	Biannually	----------									[b]
External radiation (TLD)	1	Quarterly	Quarterly	----------									[a]
Chem-Nuclear Services site near Barnwell, S.C.:													
Soil	4	Quarterly	Quarterly	X									
External radiation (TLD)	4	Quarterly	Quarterly	----------									[a]
Savannah River Plant:													
Marine life	3	Biannually	Biannually	X	----------			X					
Allied-Gulf Nuclear Services:													
Soil	8	Quarterly	Quarterly	X									
External radiation (TLD)	4	Quarterly	Quarterly	----------									[a]
Vegetation	5	Seasonal	Seasonal	X									
Marine life	2	Biannually	Biannually	X	----------			X					
Water:													
General	0												
Source oriented:													
H.B. Robinson Nuclear Power Plant:													
Surface	15	Weekly	Weekly	X	X	X	----------						[c] H
Ground-public supply	9	Monthly	Monthly	X	X	X	----------						[c] H
Westinghouse:													
Surface	3	Monthly	Monthly	------	X	X							
	9	Biannually	Biannually	------	X	X							
External radiation (TLD)	1	Quarterly	Quarterly	----------									[a]
Chem-Nuclear Services site near Barnwell, S.C.													
Surface	1	Monthly	Monthly	X	X	X							
Ground	3	Quarterly	Quarterly	X	X	X							
	3	Monthly	Monthly	X	X	X							
Surface-public supply	2	Monthly	Monthly	X	X	X	----------						[c] H
Savannah River Plant:													
Surface	2	Quarterly	Quarterly	X	X	X	----------						[b]
	3	Monthly	Monthly	X	X	X	----------						[b]
	2	Weekly	Weekly	X	X	X							
Surface (raw)	2	Monthly	Monthly	------	X	X	----------						[c] H
Allied-Gulf Nuclear Services:													
Surface	5	Monthly	Monthly	X	X	X	----------						[c] H
	6	Quarterly	Quarterly	X	X	X	----------						[c] H
Ground-well	2	Quarterly	Quarterly	X	X	X	----------						[c] H
Public supply-well	2	Monthly	Monthly	X	X	X	----------						[c] H
Wm. B. McGuire Nuclear Station:													
Surface	3	Quarterly	Quarterly	X	X	X							
Public supply	2	Quarterly	Quarterly	X	X	X							
Oconee Nuclear Station:													
Surface	4	Monthly	Monthly	X	X	X							
Public supply	4	Quarterly	Quarterly	X	X	X	----------						[c] H
Virgil C. Summer Nuclear Station:													
Surface	2	Quarterly	Quarterly	X	X	X							
Public supply	4	Quarterly	Quarterly	X	X	X							

[a] Direct radiation

[b] Special nuclides.

Table 1. Summary of State environmental surveillance programs, 1972—continued

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis									
				γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
SOUTH DAKOTA													
Population: 666,300 Area: 77,047 mi²													
Air	0												
Milk	0												
Miscellaneous	0												
Water	0												
TENNESSEE													
Population: 3,924,200 Area: 42,246 mi²													
Air	0												
Milk:													
General:													
Pasteurized	1	2/month	2/month				X	X	X	X	X	X	
Source oriented:													
Oak Ridge:													
Pasteurized	2	2/month	2/month				X	X	X	X	X	X	
Browns Ferry:													
Pasteurized	1	2/month	2/month				X	X	X	X	X	X	
Sequoyah Nuclear Plant	*1	Monthly	Monthly				X	X	X	X	X	X	
Miscellaneous:													
General	0												
Source oriented:													
American Nuclear Corp:													
Soil	1	5/week	Monthly	X				X					[b]
Water:													
General:													
Surface	4	Daily	Monthly		X	X							
	1	Monthly	Monthly		X	X							
Source oriented:													
Oak Ridge:													
Surface	1	Monthly	Monthly		X	X							
	1	Daily	Monthly		X	X							
Sequoyah Nuclear Plant:													
Surface	2	Monthly	Monthly		X	X							
Public supply	1	Monthly	Monthly		X	X							
American Nuclear Corp:													
Surface	1	Weekly	Weekly		X	X							[b]
Public supply	1	Daily	Monthly	X	X	X							^{60}Co
Ground	1	Weekly	Weekly		X	X							[b]
W. R. Grace Co:													
Surface	4	Monthly	Monthly		X	X							
	1	Daily	Monthly		X	X							
Nuclear Fuel Services:													
Surface	2	Monthly	Monthly		X	X							
	1	Daily	Monthly		X	X							

* Split, with Eastern Environmental Radiation Facility, Montgomery, Ala.

[b] XY plot comparison for ^{60}Co–^{137}Cs.

Table 1. Summary of State environmental surveillance programs, 1972—continued

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis									
				γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
TEXAS													
Population: 11,196,700 Area: 267,339 mi²													
Air:													
General	5	Daily	Daily	----------		X							
Source oriented	0												
Milk:													
General	12	4/year	4/year	X	----------		X	X	X	X	(a)	X	
	1	Monthly	Monthly	X	----------		X	X	X	X	(a)	X	
Source oriented:													
Texas A & M	1	Monthly	Monthly	X	----------		X	X	X	X	(a)	X	
Miscellaneous:													
General:													
Mud, silt, dirt	1	2/year	2/year	X	X	X							
Oysters	4	2/year	2/year	X	X	X							
Source oriented:													
Texas A & M:													
Mud, dirt	4	2/year	2/year	X	X	X							
Vegetation	2	3/year	3/year	X	X	X							
Todd Shipyards:													
Mud, dirt	2	1/year	1/year	X	X	X							
Oysters	2	2–6/year	2–6/year	X	X	X							
Houston:													
Mud, dirt	20	2/year	2/year	X	X	X							
Vegetation	2	2/year	2/year	X	X	X							
Uranium Dist:													
Mud, dirt	8	3/year	3/year	X	X	X							
Oysters	2	2/year	2/year	X	X	X							
Pantex:													
Mud, dirt	2	2/year	2/year	X	X	X							
Water:													
General:													
Surface	2	4/year	4/year	X	X	X							
Source oriented:													
Texas A & M:													
Surface	3	20–30/year	20–30/year	X	X	X							
	2	4–6/year	4–6/year	X	X	X							
Todd Shipyards:													
Sea	3	2/month	2/month	X	------	X							
University of Texas:													
Surface	4	4/year	4/year	X	X	X							
Uranium Dist:													
Surface	6	1/month	1/month	X	X	X	----------						^{226}Ra, ^{238}U
	10	6/year	6/year	X	X	X	----------						^{226}Ra, ^{238}U
Municipal drinking	30	2/year	2/year	X	X	X	----------						^{226}Ra, ^{238}U[a]
Private drinking	50	1–2/year	1–2/year	X	X	X	----------						^{226}Ra, ^{238}U[a]

[a] When indicated.

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis									
				γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
UTAH													
Population: 1,059,300 Area: 84,916 mi²													
Air:													
General	0												
Source oriented:													
Nevada Test Site	18	Daily	Daily	----------		X							
Milk:													
General	0												
Source oriented:													
Nevada Test Site	17	Biweekly,[a]	Biweekly,[a]	----------			X	X	X	X	X	X	
Miscellaneous	0												
Water:													
General	0												
Source oriented:													
Waste water treatment plants:													
Surface[b]	48	4/year	4/year	------	X	X	----------						^{3}H,[c]
Effluent	1	4/year	4/year	------	X	X	----------						^{3}H,[c]

[a] When a test—atmospheric or underground—takes place, samples are collected daily until level of contamination is established.

[b] Waste water treatment plant outfall-all samples taken above outfall.

[c] To establish a baseline for the analysis of ^{3}H in the environment.

Table 1. Summary of State environmental surveillance programs, 1972—continued

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis									
				γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
VERMONT													
Population: 444,700 Area: 9,609 mi²													
Air:													
General	2	Weekly	Weekly	(a)	X	X							
Source oriented:													
Vermont Yankee	6	Weekly	Weekly	(a)	X	X							
Milk:													
General	0												
Source oriented:													
Vermont Yankee	4	Monthly	Monthly	X	----------		X	X	X	X	------	X	
Miscellaneous:													
General:													
External radiation (TLD)	2	Monthly	Monthly	----------									(b)
	2	Semiannually	Semiannually	----------									(b)
Source oriented:													
Vermont Yankee:													
External radiation (TLD)	11	Monthly	Monthly	----------									(b)
	6	Semiannually	Semiannually	----------									(b)
Clams, mud, etc	1	Annually	Annually	X	X	X							
Grass, maple sap	1	Annually	Annually	X	X	X							
Fish	5	Semiannually	Semiannually	X	X	X							
Local crops, eggs	2	Annually	Annually	X	X	X							
Mushrooms	3	Semiannually	Semiannually	X									
Water:													
General	0												
Source oriented:													
Vermont Yankee: [c]													
Surface	2	Monthly	Monthly	(a)	X	X							
Ground	3	Monthly	Monthly	(a)	X	X							
Public supply	1	Monthly	Monthly	(a)	X	X							

[a] Quarterly composite (scans of air filters are qualitative only).
[b] Direct radiation.
[c] Random—approximately 40 private water supplies have been sampled. All supplies will be sampled again about 6 months following startup.

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis									
				γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
VIRGINIA													
Population: 4,648,500 Area: 40,817 mi²													
Air	0												
Milk:													
General:													
Pasteurized	4	Monthly	Monthly	----------			X	X	X	X	X	X	
Source oriented:													
Surry Reactor:													
Raw	3	Monthly	Monthly	----------			X	X	X	X	X	X	
Miscellaneous:													
General:													
Oysters	3	Semiannually	Semiannually	X	------	X	X	X	X	X	----------		(a)
Silt	4	Semimonthly	Semimonthly	X	------	X	X	X	X	X	----------		(a)
Source oriented:													
Surry Reactor:													
Oysters	6	Monthly	Monthly	X	------	X	X	X	X	X	----------		(a)
Rangia	3	Monthly	Monthly	X	------	X	X	X	X	X	----------		(a)
Silt	6	Monthly	Monthly	X	------	X	X	X	X	X	----------		(a)
Navy Yard:													
Oysters	1	Monthly	Monthly	X	------	X	X	X	X	X	----------		(a)
D & S Piers:													
Oysters	1	Monthly	Monthly	X	------	X	X	X	X	X	----------		(a)
NNSBDD Company:													
Silt	2	Monthly	Monthly	X	------	X	X	X	X	X			
Water:													
General:													
Surface	3	Semiannually	Semiannually	X	------	X	X	X	X	X	X	X	^{54}Mn [a]
	4	Monthly	Monthly	X	------	X	X	X	------	X	X	X	(b)
	1	Semiannually	Semiannually	X	------	X	X	X	------	X	X	X	(b)
Public supply	(c)	3/month	3/month	----------		X							
Ground	(c)	As available	As available	----------		X							
Source oriented:													
Surry Reactor:													
Surface	9	Monthly	Monthly	----------		X	X	X	X	X	X	X	(a)
Navy Yard:													
Surface	1	Monthly	Monthly	----------		X	X	X	X	X	X	X	(a)
D & S Piers:													
Surface	1	Monthly	Monthly	----------		X	X	X	X	X	X	X	(a)

[a] ^{106}Ru-Rh, ^{65}Zn, ^{95}Zr-Nb.
[b] ^{106}Ru-Rh, ^{95}Zr-Nb.
[c] Varies statewide.
NNSBDD Co., Newport News Shipbuilding and Dry Dock Co.

Table 1. Summary of State environmental surveillance programs, 1972—continued

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis								
				γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
WASHINGTON													
Population: 3,409,200													
Area: 68,192 mi²													
Air	0												
Milk:													
General	2	Monthly	Monthly				X	X	X	X		X	^{65}Zn
Source oriented:													
Hanford	2	Bimonthly	Bimonthly				X	X	X	X		X	^{65}Zn
Miscellaneous:													
General	0												
Source oriented:													
Hanford:													
Shellfish	1	Bimonthly	Bimonthly							X			(a)
Nuclear ships:													
Shellfish	1	Annually	Annually							X			(a)
Sediment	2	Annually	Annually	X		X				X			
Water:													
General:													
Surface	4	Monthly	Monthly			X							
Source oriented:													
Hanford:													
Surface	1	Weekly	Weekly			X							^{46}Sc, ^{51}Cr,[a]
	1	Monthly	Monthly			X							^{46}Sc, ^{51}Cr,[a]
Nuclear ships:													
Surface, salt water	1	Semiannually	Semiannually	X		X							

[a] ^{65}Zn, ^{95}Zr, ^{106}Ru, ^{32}P.

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis								
				γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
WEST VIRGINIA													
Population: 1,744,200													
Area: 24,181 mi²													
Air	0												
Milk:													
General	1	Monthly	Monthly				X	X	X	X			
	1	Quarterly	Quarterly								X	X	
Source oriented	0												
Miscellaneous	0												
Water:													
General:													
Interstate carriers	12	Annually	Annually		X	X							
Potable public water supplies	139	Once/3 years	Once/3 years		X	X							
Source oriented	0												

Table 1. Summary of State environmental surveillance programs, 1972—continued

State, media, and site	Number of sites	Collection frequency	Analysis frequency	Analysis									
				γ scan	Gross α	Gross β	^{131}I	^{137}Cs	^{140}Ba	^{40}K	^{89}Sr	^{90}Sr	Other
WISCONSIN													
Population: 4,417,900 Area: 56,154 mi²													
Air:													
General	1	5/week	5/week			X							
	3	Weekly	Monthly	X		(a)		X					
Source oriented:													
Genoa	2	Weekly	Monthly	X		(a)		X					
Point Beach—Kewaunee	4	Weekly	Monthly	X		(a)		X					
Prairie Island	3	Weekly	Monthly	X		(a)		X					
Milk:													
General	6	Weekly	Weekly				X	X	X	X		(b)	
Source oriented:													
Genoa	1	Monthly	Monthly				X	X	X	X		X	
Point Beach—Kewaunee	1	Monthly	Monthly				X	X	X	X		X	
Prairie Island	1	Monthly	Monthly				X	X	X	X		X	
Miscellaneous:													
General:													
Silt	2	Semiannually	Semiannually		X	X							
Soil	3	Semiannually	Semiannually		X	X							
Source oriented:													
Genoa:													
Silt	4	Semiannually	Semiannually		X	X							
Soil	8	Semiannually	Semiannuallly		X	X							
Vegetation	8	Semiannually	Semiannually		X	X							
Point Beach—Kewaunee:													
Soil	11	Semiannually	Semiannually		X	X							
Vegetation	11	Semiannually	Semiannually		X	X							
Algae	1	Semiannually	Semiannually		X	X							
Prairie Island:													
Silt	2	Semiannually	Semiannually		X	X							
Soil	6	Semiannually	Semiannually		X	X							
Vegetation	6	Semiannually	Semiannually		X	X							
Water:													
General:													
Surface	10	Monthly	Monthly		X	X							
Precipitation	4	(c)	(c)			X							
Source oriented:													
Genoa:													
Surface	5	Monthly	Monthly		X	X							X
	2	Semiannually	Semiannually		X	X		X					
Precipitation	1	(c)	(c)			X							
Ground	3	Semiannually	Semiannually		X	X							
Point Beach—Kewaunee:													
Surface	5	Semiannually	Semiannually		X	X		X					X
Precipitation	4	(c)	(c)			X							
Ground	6	Semiannually	Semiannually		X	X							
Prairie Island:													
Surface	5	Semiannually	Semiannually		X	X		X					X
Precipitation	3	(c)	(c)			X							
Ground	3	Semiannually	Semiannually[c]		X	X							

[a] Weekly.
[b] Monthly.
[c] After each rain greater than 0.1 inch.

WYOMING

Population: 332,400
Area: 97,914 mi²

Air	0												
Milk	0												
Miscellaneous	0												
Water:													
General:													
Surface	28	Quarterly	Quarterly		X	X							
Source oriented:													
Shirley Uranium:													
Surface	3	Quarterly	Quarterly		X	X							

SECTION I. MILK AND FOOD

Milk Surveillance, November 1972

Although milk is only one of the sources of dietary intake of environmental radioactivity, it is the food item that is most useful as an indicator of the general population's intake of radionuclide contaminants resulting from environmental releases. Fresh milk is consumed by a large segment of the population and contains several of the biologically important radionuclides that may be released to the environment from nuclear activities. In addition, milk is produced and consumed on a regular basis, is convenient to handle and analyze, and samples representative of general population consumption can be readily obtained. Therefore, milk sampling networks have been found to be an effective mechanism for obtaining information on current radionuclide concentrations and long-term trends. From such information, public health agencies can determine the need for further investigation or corrective public health action.

The Pasteurized Milk Network (PMN) sponsored by the Office of Radiation Programs, Environmental Protection Agency, and the Office of Food Sanitation, Food and Drug Administration, Public Health Service, consists of 63 sampling stations: 61 located in the United States, one in Puerto Rico, and one in the Canal Zone. Many of the State health departments also conduct local milk surveillance programs which provide more comprehensive coverage within the individual State. Data from 15 of these State networks are reported routinely in *Radiation Data and Reports*. Additional networks for the routine surveillance of radioactivity in milk in the Western Hemisphere and their sponsoring organizations are:

Pan American Milk Sampling Program (Pan American Health Organization and U.S. Environmental Protection Agency)—5 sampling stations

Canadian Milk Network (Radiation Protection Division, Canadian Department of National Health and Welfare)—16 sampling stations.

The sampling locations that make up the networks presently reporting in *Radiation Data and Reports* are shown in figure 1. Based on the similar purpose for these sampling activities, the present format integrates the complementary data that are routinely obtained by these several milk networks.

Radionuclide and element coverage

Considerable experience has established that relatively few of the many radionuclides that are formed as a result of nuclear fission become incorporated in milk (*1*). Most of the possible radiocontaminants are eliminated by the selective metabolism of the cow, which restricts gastrointestinal uptake and secretion into the milk. The five fission-product radionuclides which commonly occur in milk are strontium-89, strontium-90, iodine-131, cesium-137, and barium-140. A sixth radionuclide, potassium-40, occurs naturally in 0.0118 percent (*2*) abundance of the element potassium, resulting in a specific activity for potassium-40 of 830 pCi/g total potassium.

Two stable elements which are found in milk, calcium and potassium, have been used as a means for assessing the biological behavior of metabolically similar radionuclides (radio-

Figure 1. Milk sampling networks in the Western Hemisphere

strontium and radiocesium, respectively). The contents of both calcium and potassium in milk have been measured extensively and are relatively constant. Appropriate values and their variations, expressed in terms of 2-standard deviations (2σ), for these elements are 1.16 $\pm$ 0.08 g/liter for calcium and 1.51 $\pm$ 0.21 g/liter for potassium. These figures are averages of data from the PMN for May 1963–March 1966 (*3*) and are used for general radiation calculations.

Accuracy of data from various milk networks

In order to combine data from the international, national, and State networks considered in this report, it was first necessary to determine the accuracy with which each laboratory is making its determinations and the agreement of the measurements among the laboratories. The Analytical Quality Control Service of the Office of Radiation Programs conducts periodic studies to assess the accuracy of determinations of radionuclides in milk performed by interested radiochemical laboratories. The generalized procedure for making such a study has been outlined previously (*4*).

The most recent study was conducted during July 1971 with 37 laboratories participating in an experiment on a milk sample containing known concentrations of iodine-131, cesium-137, strontium-89, and strontium-90 (*5*). Of the 17 laboratories producing data for the networks reporting in *Radiation Data and Reports*, 14 participated in the study.

The accuracy results of this study for these 14 laboratories are shown in table 1. Considerable improvement has been made in the accuracy of the analyses of all radionuclides compared to the results of previous studies. Some improvement is still needed in the technique for determining the strontium-90 results. These possible differences should be kept in mind when considering the integration of data from the various networks.

Development of a common reporting basis

Since the various networks collect and analyze samples differently, a complete understanding of several parameters is useful for interpreting the data. Therefore, the various milk surveillance networks that report regularly were surveyed for information on analytical methods, sampling and analysis frequencies, and estimated analytical errors associated with the data.

In general, radiostrontium is collected by an ion-exchange technique and determined by beta-particle counting in low-background detectors, and the gamma-ray emitters (potassium-40, iodine-131, cesium-137, and barium-140) are determined by gamma-ray spectroscopy of whole milk. Each laboratory has its own modifications and refinements of these basic methodologies.

Many networks collect and analyze samples on a monthly basis. Some collect samples more frequently but composite the several samples for one analysis, while others carry out their analyses more often than once a month. Many networks are analyzing composite samples on a quarterly basis for certain nuclides. The frequency of collection and analysis varies not only among the networks but also at different stations within some of the networks. In addition, the frequency of collection and analysis is a function of current environmental levels. The number of samples analyzed at a particular sampling station under current conditions is

Table 1. Distribution of mean results, quality control experiment

Isotope and known concentration	Number of laboratories in each category				Experimental 2σ error (pCi/liter)
	Acceptable [a]	Warning level [b]	Unacceptable [c]	Total	
Iodine-131 (69 pCi/liter)	13 (100%)	0	0	13	6
Cesium-137 (52 pCi/liter)	12 (92%)	1 (8%)	0	13	6
Strontium-89 (31 pCi/liter)	9 (90%)	1 (10%)	0	10	6
Strontium-90 (41.6 pCi/liter)	9 (69%)	1 (8%)	3 (23%)	13	2.4

[a] Measured concentration equal to or within 2σ of the known concentration.
[b] Measured concentration outside 2σ and equal to or within 3σ of the known concentration.
[c] Measured concentration outside 3σ of the known concentration.

reflected in the data presentation. Current levels for strontium-90 and cesium-137 are relatively stable over short periods of time, and sampling frequency is not critical. For the short-lived radionuclides, particularly iodine-131, the frequency of analysis is critical and is generally increased at the first measurement or recognition of a new influx of this radionuclide.

The data in table 2 show whether raw or pasteurized milk was collected. An analysis (*6*) of raw and pasteurized milk samples collected during January 1964 to June 1966 indicated that for relatively similar milkshed or sampling areas, the differences in concentration of radionuclides in raw and pasteurized milk are not statistically significant (*6*). Particular attention was paid to strontium-90 and cesium-137 in that analysis.

Practical reporting levels were developed by the participating networks, most often based on 2-standard-deviation counting errors or 2-standard-deviation total analytical errors from replicate analyses (*3*). The practical reporting level reflects analytical factors other than statistical radioactivity counting variations and will be used as a practical basis for reporting data.

The following practical reporting levels have been selected for use by all networks whose practical reporting levels were given as equal to or less than the given value.

Radionuclide	Practical reporting level (pCi/liter)
Strontium-89	5
Strontium-90	2
Iodine-131	10
Cesium-137	10
Barium-140	10

Some of the networks gave practical reporting levels greater than those above. In these cases, the larger value is used so that only data considered by the network as meaningful will be presented. The practical reporting levels apply to the handling of individual sample determinations. The treatment of measurements equal to or below these practical reporting levels for calculation purposes, particularly in calculating monthly averages, is discussed in the data presentation.

Analytical error or precision expressed as pCi/liter or percent in a given concentration range has also been reported by the networks (*3*). The precision errors reported for each of the radionuclides fall in the following ranges:

Radionuclide	Analytical errors of precision (2-standard deviations)
Strontium-89	1–5 pCi/liter for levels <50 pCi/liter; 5–10% for levels ≧ 50 pCi/liter;
Strontium-90	1–2 pCi/liter for levels <20 pCi/liter; 4–10% for levels ≧ 20 pCi/liter;
Iodine-131, Cesium-137, Barium-140	4–10 pCi/liter for levels <100 pCi/liter; 4–10% for levels ≧ 100 pCi/liter.

For iodine-131, cesium-137, and barium-140, there is one exception for these precision error ranges: 25 pCi/liter at levels <100 pCi/liter for Colorado. This is reflected in the practical reporting level for the Colorado milk network.

Federal Radiation Council guidance applicable to milk surveillance

In order to place the U.S. data on radioactivity in milk presented in *Radiation Data and Reports* in perspective, a summary of the guidance provided by the Federal Radiation Council for specific environmental conditions was presented in the February 1973 issue of *Radiation Data and Reports.*

Data reporting format

Table 2 presents the integrated results of the international, national, and State networks discussed earlier. Column 1 lists all the stations which are routinely reported in *Radiation Data and Reports.* The relationship between the PMN stations and the State stations is shown in figure 2. The first column in table 2 under each of the reported radionuclides gives the monthly average for the station and the number

Table 2. Concentrations of radionuclides in milk for November 1972 and 12-month period, December 1971 through November 1972

Sampling location		Type of sample [a]	Radionuclide concentration (pCi/liter)			
			Strontium-90		Cesium-137	
			Monthly average [b]	12-month average	Monthly average [b]	12-month average
UNITED STATES:						
Ala:	Montgomery [c]	P	NA	6	0	6
Alaska:	Palmer [c]	P	4	5	0	7
Ariz:	Phoenix [c]	P	NA	0	0	0
Ark:	Little Rock [c]	P	12	11	0	5
Calif:	Sacramento [c]	P	NA	1	0	0
	San Francisco [c]	P	NA	1	0	0
	Del Norte	P	9	12	8	10
	Fresno	P	0	1	4	4
	Humboldt	P	3	4	3	7
	Los Angeles	P	2	2	3	4
	Mendocino	P	2	5	3	5
	Sacramento	P	2	2	7	5
	San Diego	P	0	1	0	4
	Santa Clara	P	0	1	0	5
	Shasta	P	2	2	5	6
	Sonoma	P	2	2	0	5
Colo:	Denver [c]	P	NA	4	0	3
	East	R	NS	NA	NS	0
	Northeast	R	NS	NA	NS	0
	Northwest	R	NS	NA	NS	0
	South Central	R	NS	NA	NS	0
	Southeast	R	NS	NA	NS	0
	Southwest	R	NS	NA	NS	0
	West	R	NS	NA	NS	4
Conn:	Hartford [c]	P	NA	5	0	7
	Central	P	6	7	11	13
Del:	Wilmington [c]	P	NA	9	0	8
D.C:	Washington [c]	P	NA	7	6 (2)	6
Fla:	Tampa [c]	P	5	5	38	37
	Central	R	2	5	52	42
	North	R	8	6	17	17
	Northeast	R	4	5	32	30
	Southeast	R	4	5	45	53
	Tampa Bay area	P	4	5	38	37
	West	R	6	8	11	15
Ga:	Atlanta [c]	P	NA	9	0	0
Hawaii:	Honolulu [c]	P	4	2	0	1
Idaho:	Idaho Falls [c]	P	4	4	0	0
Ill:	Chicago [c]	P	5	5	13	10
Ind:	Indianapolis [c]	P	NA	6	13	3
	Central	P	7	7	10	10
	Northeast	P	7	6	15	11
	Northwest	P	9	8	0	12
	Southeast	P	9	8	0	10
	Southwest	P	4	8	10	11
Iowa:	Des Moines [c]	P	NA	4	0	0
	Iowa City	P	6	7	0	7
	Des Moines	P	5	6	0 (3)	6
	Little Cedar	P	8	5	0	9
	Spencer	P	NS	7	NS	13
Kans:	Wichita [c]	P	NA	7	0	0
	Coffeyville	P	NA	8	0	10
	Dodge City	R	NA	5	0	8
	Falls City, Nebr	P	NA	3	0	8
	Hays	P	NA	9	0	7
	Kansas City	P	NA	8	0	9
	Topeka	P	NA	7	0	8
	Wichita	P	NA	8	0	6
Ky:	Louisville [c]	P	NA	7	0	6
La:	New Orleans [c]	P	10	13	0	4
Maine:	Portland [c]	P	NA	6	27	22
Md:	Baltimore [c]	P	NA	7	0	6
Mass:	Boston [c]	P	7	7	13	13
Mich:	Detroit [c]	P	NA	6	0	8
	Grand Rapids [c]	P	NA	8	0	7
	Bay City	P	4	5	0 (2)	9
	Charlevoix	P	0	6	6 (4)	10
	Detroit	P	3	4	0	9
	Grand Rapids	P	0	4	15	8
	Lansing	P	3	5	0 (2)	9
	Marquette	P	3	5	8 (2)	20
	Monroe	P	0	2	0 (2)	4
	South Haven	P	4	7	7 (4)	8
Minn:	Minneapolis [c]	P	NA	7	17	16
	Bemidji	P	10	11	25	19
	Duluth	P	17	21	19	26
	Fergus Falls	P	7	7	10	15
	Little Falls	P	NS	18	NS	41
	Mankato	P	6	10	17	11
	Marshall	P	6	5	18	15

See footnotes at end of table.

Table 2. Concentrations of radionuclides in milk for November 1972 and 12-month period, December 1971 through November 1972—continued

Sampling location		Type of sample [a]	Radionuclide concentration (pCi/liter)			
			Strontium-90		Cesium-137	
			Monthly average [b]	12-month average	Monthly average [b]	12-month average
UNITED STATES:—Continued						
Minn:	Minneapolis	P	9	11	18	15
	Rochester	P	8	7	5	11
Miss:	Jackson *	P	NA	9	13	8
Mo:	Kansas City *	P	NA	5	0	3
	St. Louis *	P	NA	6	0	3
Mont:	Helena *	P	NA	4	0	3
Nebr:	Omaha *	P	NA	6	0	1
Nev:	Las Vegas *	P	NA	1	0	0
N.H:	Manchester *	P	NA	8	0	16
N.J:	Trenton *	P	NA	7	0	5
N. Mex:	Albuquerque *	P	NA	1	0	0
N.Y:	Buffalo *	P	4	5	0	5
	New York City *	P	NA	8	0	8
	Syracuse *	P	NA	6	0	7
	Albany	P	4	6	0	0
	Buffalo	P	5	7	0	0
	Massena	P	5	7	0	0
	New York City	P	NS	NS	NS	NS
	Syracuse	P	8	5	0	0
N.C:	Charlotte *	P	NA	9	11	7
N. Dak:	Minot *	P	NA	9	0	7
Ohio:	Cincinnati *	P	NA	6	13	4
	Cleveland *	P	NA	7	0	7
Okla:	Oklahoma City *	P	NA	5	0	3
Oreg:	Portland *	P	5	5	0	3
	Baker	P	NA		NA	
	Coos Bay	P	NA		NA	
	Eugene	P	NA		NA	
	Medford	P	NA		NA	
	Portland composite	P	NA		NA	
	Portland local	P	NA		NA	
	Redmond	P	NA		NA	
	Tillamook	R	NA		NA	
Pa:	Philadelphia *	P	NA	6	0	3
	Pittsburgh *	P	NA	9	0	6
	Dauphin	P	0	5	0	11
	Erie	P	6	8	0	11
	Philadelphia	P	6	5	0	7
	Pittsburgh	P	7	7	0	13
R.I:	Providence *	P	NA	6	0	10
S.C:	Charleston *	P	9	8	18	14
S. Dak:	Rapid City *	P	NA	7	0	3
Tenn:	Chattanooga *	P	NA	8	11	8
	Memphis *	P	NA	7	0	2
	Chattanooga	P	6	10	11	10
	Clinton	R	8	10	16	14
	Fayetteville	R	9	10	12	6
	Kingston	P	10	10	10	7
	Knoxville	P	7	8	11	7
	Lawrenceburg	R	NS	8	NS	9
	Nashville	P	5	8	15	7
	Pulaski	R	5	6	15	8
	Sequoyah	R	8	7	0	17
Tex:	Austin *	P	NA	2	0	0
	Dallas *	P	NA	6	0	0
	Amarillo	R	NA		NA	
	Corpus Christi	R	NA		NA	
	El Paso	R	NA		NA	
	Fort Worth	R	NA		NA	
	Harlingen	R	NA		NA	
	Houston	R	NA		NA	
	Lubbock	R	NA		NA	
	Midland	R	NA		NA	
	San Antonio	R	NA		NA	
	Texarkana	R	NA		NA	
	Uvalde	R	NA		NA	
	Wichita Falls	R	NA		NA	
Utah:	Salt Lake City *	P	3	3	0	3
Vt:	Burlington *	P	NA	6	13	10
Va:	Norfolk *	P	NA	6	0	7
Wash:	Seattle *	P	NA	3	0	2
	Spokane *	P	NA	4	0	6
	Benton County	R	0	1	0	0
	Franklin County	R	NS	1	NS	0
	Longview	R	4		0	
	Sandpoint, Idaho	R	4	9	0	12
	Skagit County	R	7	7	12	4
W. Va:	Charleston *	P	NA	8	11	5
Wisc:	Milwaukee *	P	NA	5	7 (2)	7
Wyo:	Laramie *	P	NA	3	0	1

See footnotes at end of table.

Table 2. Concentrations of radionuclides in milk for November 1972 and 12-month period, December 1971 through November 1972—continued

Sampling location	Type of sample [a]	Radionuclide concentration (pCi/liter)			
		Strontium-90		Cesium-137	
		Monthly average [b]	12-month average	Monthly average [b]	12-month average
CANADA:					
Alberta: Calgary	P	NA		9	17
Edmonton	P	NA		9	26
British Columbia: Vancouver	P	NA		21	21
Manitoba: Winnipeg	P	NA		10	18
New Brunswick: Moncton	P	NA		9	9
Newfoundland: St. John's	P	NA		11	24
Nova Scotia: Halifax	P	NA		7	17
Ontario: Ottawa	P	NA		3	9
Sault Ste. Marie	P	NA		14	23
Thunder Bay	P	NA		19	22
Toronto	P	NA		7	8
Windsor	P	NA		4	8
Quebec: Montreal	P	NA		5	12
Quebec	P	NA		17	22
Saskatchewan: Regina	P	NA		5	14
Saskatoon	P	NA		4	13
CENTRAL AND SOUTH AMERICA:					
Canal Zone: Cristobal [c]	P	NA	1	0	9
Chile: Santiago	P	0	1	0	1
Colombia: Bogota	P	NS	0	NS	0
Ecuador: Guayaquil	P	0	0	0	0
Jamaica: Mandeville	P	2	3	23	45
Puerto Rico: San Juan [c]	P	NS	1	NS	3
Venezuela: Caracas	P	0	0	0	0
PMN network average [e]		6	6	4	6

[a] P, pasteurized milk.
R, raw milk.

[b] When an individual sampling result was equal to or less than the practical reporting level, a value of "0" was used for averaging. Monthly averages less than the practical reporting level reflect the fact that some but not all of the individual samples making up the average contained levels greater than the practical reporting level. When more than one analysis was made in a monthly period, the number of samples in the monthly average is given in parentheses.

[c] Pasteurized Milk Network station. All other sampling locations are part of the State or National network.

[d] The practical reporting levels for these networks differ from the general ones given in the text. Sampling results for the networks were equal to or less than the following practical reporting levels:

Cesium–137: Colorado—25 pCi/liter
Oregon —15 pCi/liter

[e] This entry gives the average radionuclide concentrations for the Pasteurized Milk Network stations denoted by footnote [c].

NA, no analysis.
NS, no sample collected.

of samples analyzed in that month in parentheses. When an individual sampling result is equal to or below the practical reporting level for the radionuclide, a value of zero is used for averaging. Monthly averages are calculated using the above convention. Averages which are equal to or less than the practical reporting levels reflect the presence of radioactivity in some of the individual samples greater than the practical reporting level.

The second column under each of the radionuclides reported gives the 12-month average for the station as calculated from the preceding 12 monthly averages, giving each monthly average equal weight. Since the daily intake of radioactivity by exposed population groups, averaged over a year, constitutes an appropriate criterion for the case where the FRC radiation protection guides apply, the 12-month average serves as a basis for comparison.

Discussion of current data

In table 2, surveillance results are given for strontium-90 and cesium-137 for November 1972 and the 12-month period, December 1971 to November 1972. Except where noted, the monthly average represents a single sample for the sampling station. Strontium-89, iodine-131, and barium-140 data have been omitted from table 2 since levels at the great majority of the stations for November 1972 were below the respective practical reporting levels. Strontium-89 results for individual samples were all below the practical reporting level with the following exception: New York, Massena (State), 8 pCi/liter.

Strontium-90 monthly averages ranged from 0 to 17 pCi/liter in the United States for November 1972, and the highest 12-month average was 21 pCi/liter (Duluth, Minn.), representing 10.5 percent of the Federal Radiation Council radiation protection guide. Cesium-137 monthly averages ranged from 0 to 52 pCi/liter in the United States for November 1972, and the highest 12-month average was 53 pCi/liter (Southeast Florida), representing 1.5 percent of the value derived from the recommendations given in the Federal Radiation Council report. Of particular interest are the consistently higher cesium-137 levels that have been observed in Florida (*8*) and Jamaica.

Table 3 gives additions and table 4, corrections for various States and months.

Table 3. Additions to table 2 for January, February, March, June, and September 1972

State	January				February			
	Strontium-90		Cesium-137		Strontium-90		Cesium-137	
	Monthly average	12-month average	Monthly average	12-month average	Monthly average	12-month average	Monthly average	12-month average
Oregon:[a]								
Baker	2	2	0	2	NA		0	2
Coos Bay	3	4	8	7	NA		0	7
Eugene	2	2	0	3	NA		0	3
Medford	2	2	14	5	NA		0	5
Portland composite	1	5	22	8	NA		0	9
Portland local	6	5	22	11	NA		0	11
Redmond	2	3	0	2	NA		0	2
Tillamook	3	4	0	0	NA		18	13
	March				September			
Oregon:[a]								
Baker	NA		0	0	NA	2	12	1
Coos Bay	NA		0	5	NA	4	21	3
Eugene	NA		0	3	NA	1	0	1
Medford	NA		0	4	NA	1	17	4
Portland composite	NA		0	9	NA	4	15	7
Portland local	NA		26	12	NA	7	14	6
Redmond	NA		0	2	NA	2	9	1
Tillamook	NA		0	13	NA	6	8	12
	June				September			
Iowa:[a]								
Iowa City	7	7	11	11	7	7	0	8
Des Moines	6	6	10	10	6	6	0	8
Spencer	NS	6	NS	11	NS	6	NS	10
Little Cedar	6	7	11	12	NS	7	NS	11

[a] State samples.

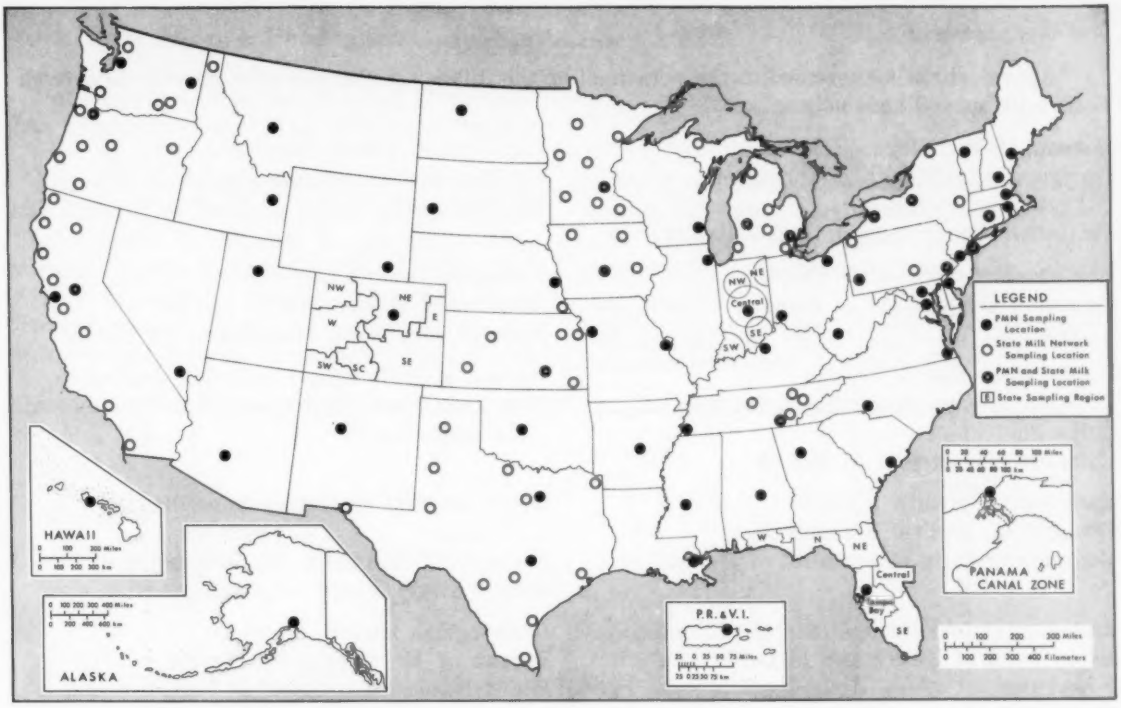

Figure 2. State and PMN milk sampling stations in the United States

Table 4. Corrections to table 2 for January, February, and March 1972

State	Strontium-90		Iodine-131		Cesium-137		Barium-140	
	Monthly average	12-month average	Monthly average	12-month average	Monthly average	12-month average	Monthly average	12-month average
January 1972								
Kansas:[a]								
Dodge City	4	6	0	2	14	8	0	3
Falls City	7	4	31	5	14	7	11	1
Hays	8	9	0	2	0	10	0	3
Kansas City	7	9	0	4	0	14	0	2
Topeka	6	8	0	3	0	9	0	4
Wichita	7	10	0	4	14	11	0	3
Colorado:[a]								
East			29 (2)[b]					
Northeast			37 (6)					
February 1972								
Kansas:[a]								
Dodge City			17					
Wichita			20					
March 1972								
Colorado:[a]								
East							45 (2)	
Tennessee:[a]								
Fayetteville			11 (3)					

[a] State samples.
[b] Number in parentheses indicates number of samples.

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Bureau of Radiological Health
Environmental Health & Consumer Protection Program
California Department of Public Health

Radiation Protection Division
Canadian Department of National Health and Welfare

Radiological Health Section
Division of Occupational and Radiological Health
Colorado Department of Health

Radiological Health Services
Division of Medical Services
Connecticut State Department of Health

Radiological and Occupational Health Section
Department of Health and Rehabilitative Services
State of Florida

Bureau of Environmental Sanitation
Division of Sanitary Engineering
Indiana State Board of Health

Division of Radiological Health
Environmental Engineering Services
Iowa State Department of Health

Radiation Control Section
Environmental Health Division
Kansas State Department of Health

Radiological Health Services
Division of Occupational Health
Michigan Department of Health

Radiation Control Section
Division of Environmental Health
State of Minnesota Department of Health

Bureau of Radiological Pollution Control
New York State Department of Environmental Conservation

Environmental Radiation Surveillance Program
Division of Sanitation and Engineering
Oregon State Board of Health

Radiological Health Section
Bureau of Environmental Health
Pennsylvania Department of Public Health

Radiological Health Services
Division of Preventable Diseases
Tennessee Department of Public Health

Division of Occupational Health
Environmental Health Services
Texas State Department of Health

Radiation Control Section
Division of Health
Washington Department of Social and Health Services

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Milk Surveillance Programs, July–September 1972

National Environmental Research Center—
Las Vegas, Environmental Protection Agency

The Milk Surveillance Network, operated by the NERC-LV,[1] consists of 30 sampling locations (figure 1) situated in the offsite area surrounding the Nevada Test Site (NTS). This routine network is operated in support of the nuclear testing programs sponsored by the U.S. Atomic Energy Commission (AEC) and by the Space Nuclear Systems Office, National Aeronautical and Space Administration.

In the event of a release of radioactivity from the NTS, special sampling within the af-

[1] This network is operated under a Memorandum of Understanding (No. AT(26-1)-539) with the Nevada Operations Office, AEC, Las Vegas, Nev.

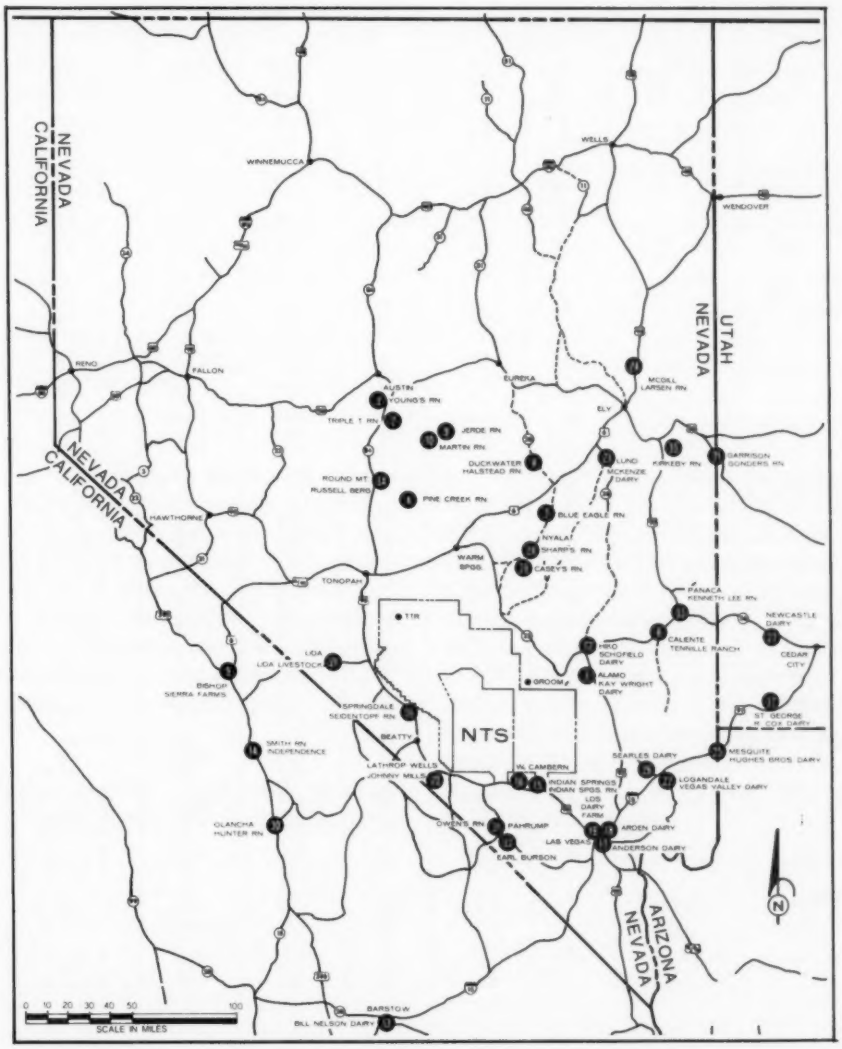

Figure 1. NERC-LV Milk Surveillance Network

Table 1. Milk surveillance results, July–September 1972

Location	Map number	Date collected (1972)	Sample type [a]	Radionuclide concentrations [b] (pCi/liter)			
				^{137}Cs	^{89}Sr	^{90}Sr	^{3}H
California:							
Bishop:							
Sierra Farms	5	7/6	11	<10	<2	4 ±2	NA
		8/2	11	<10	<5	<3	NA
		9/6	11	<10	<2	2.2±1.5	NA
Hinkley:							
Bill Nelson Dairy	13	7/3	12	<10	<1	<1	NA
		8/1	12	<10	<2	2 ±1	NA
		9/5	12	<10	<2	<1	NA
Independence:							
Smith Ranch	14	7/6	13	<10	<2	<1	NA
		8/2	13	<10	<2	3 ±1	NA
		9/5	13	<10	<2	1.8±1.4	NA
Olancha:							
Hunter Ranch	30	7/5	13	<10	2±2	<1	NA
Nevada:							
Alamo:							
Williams Dairy	1	7/5	12	<10	3±2	<2	NA
		8/1	12	<10	4±4	3 ±3	NA
		9/5	12	<10	<2	3.0±1.6	NA
Austin:							
Triple T Ranch	2	7/11	13	<10	6±4	7 ±2	670±210
Young's Ranch	3	9/6	13	<10	<3	1.7±1.6	NA
Belmont:							
Pine Creek Ranch	4	7/10	13	20	<2	2 ±1	NA
		8/1	13	20	<6	6 ±4	NA
		9/5	13	10	<4	3.9±2.1	NA
Caliente:							
Tennille Ranch	6	7/5	13	<10	5±2	1 ±1	NA
		8/3	13	<10	<4	2 ±2	NA
		9/5	13	<10	<2	<1.6	NA
Currant:							
Blue Eagle Ranch	7	7/12	13	50	3±2	4.0± .9	NA
Duckwater:							
Halstead Ranch	8	7/12	13	<10	6±2	3 ± .9	NA
		8/2	13	<10	<3	3 ±2	NA
		9/7	13	<10	<2	<1.5	NA
Eureka:							
Martin Ranch	10	7/22	13	[c] <100	7±3	5 ±1	NA
		8/24	13	<10	<3	6 ±1.9	NA
		9/19	13	<10	<3	4 ±2	NA
Hiko:							
Schofield Dairy	12	7/5	12	<10	3±2	<2	<200
		8/1	12	<10	<2	2 ±1	<210
		9/5	12	<10	2±2	<1.4	<230
Indian Springs:							
Cambern Ranch (A)	16						
Indian Springs Ranch	15						
Las Vegas:							
Anderson Dairy	17	7/11	11	<10	<2	2 ± .9	NA
		8/17	11	<10	2±2	<1.3	NA
		9/18	11	<10	<2	1.8±1.3	NA
Arden Dairy	18	7/11	11	<10	NA	NA	NA
		8/17	11	<10	<2	1.4±1.2	NA
		9/18	11	<10	2	1 ±1	NA
LDS Dairy Farms	19	7/11	12	<10	<2	<1	<220
		8/17	12	<10	<2	2 ±1.2	<270
		9/18	12	<10	<2	2.2±1.1	<200
Lathrop Wells:							
Mills Ranch	20	7/12	13	<10	<1	1 ± .7	NA
		8/2	13	<10	<3	<2	NA
Lida:							
Lida Livestock Company	21	7/9	13	<10	<2	4 ± .9	NA
		8/1	13	<10	<2	4 ±2	NA
Logandale:							
Vegas Valley Dairy	22	7/7	12	<10	<2	2 ±1	NA
		8/3	12	<10	4±4	<2	NA
		9/5	12	<10	<2	<1.3	NA
Lund:							
McKenzie Dairy	23	7/11	12	<10	3±2	3 ± .8	<230
		8/3	12	<10	3±3	2 ±2	320±200
		9/6	12	<10	<2	1.4±1.4	230±210
McGill:							
Larsen Ranch	24	7/10	13	<10	7±2	2 ± .9	NA
		9/7	13	<10	<2	1.2±1.2	NA
Mesquite:							
Hughes Bros Dairy	25	7/5	12	<10	<2	<1	220±220
		8/2	12	<10	<3	<2	<210
		9/5	12	<10	<2±2	<1.0	380±210
Moapa:							
Searles Dairy	26	7/5	12	<10	5±2	1 ± .8	NA
		8/1	12	<10	<4	5 ±2	NA
		9/5	12	<10	<2	1.7±1.4	NA

See footnotes at end of table.

Table 1. Milk surveillance results, July–September 1972—continued

Location	Map number	Date collected (1972)	Sample type [a]	Radionuclide concentrations [b] (pCi/liter)			
				^{137}Cs	^{89}Sr	^{90}Sr	^{3}H
Nevada—continued							
Nyala:							
Sharp's Ranch	28	7/5	13	[c]<100	3±2	3 ±2	220±220
		8/2	13	10	<2	3 ±2	<210
		9/7	13	<10	NA	NA	<210
Pahrump:							
Owens Ranch	31	7/14	13	<10	1±1	.9± .6	NA
		8/8	13	<10	<3	<2	NA
		9/5	13	<10	<2	<1.1	NA
Panaca:							
Kenneth Lee Ranch	33	7/5	13	<10	5±2	<2	NA
		8/2	13	<10	<5	4 ±3	NA
		9/6	13	<10	<2	2.9±1.5	NA
Round Mt:							
Russell Berg Ranch	34	7/11	13	20	<2	3 ± .9	NA
		8/2	13	<10	<3	4 ±2	NA
Shoshone:							
Kirkeby Ranch	35	7/12	13	<10	3±2	4 ±2	NA
		9/6	13	<10	<3	3.8±1.8	NA
Springdale:							
Seidentopf Ranch	36	7/11	13	<10	5±2	2 ± .9	NA
		8/2	13	<10	<2	3 ±1	NA
		9/1	13	<10	<2	1.6±1.3	NA
Utah:							
Garrison:							
Gonders Ranch	11	7/13	13	<10	<2	2 ± .8	NA
		8/1	13	<10	<2	3 ±2	NA
		9/5	13	<10	<2	<1.5	NA
New Castle:							
Newcastle Dairy	27	7/6	12	<10	2±2	2 ±1	NA
		8/2	12	<10	<4	<2	NA
		9/7	12	<10	NA	NA	NA
St. George:							
R. Cox Dairy	37	7/5	12	<10	<2	3 ±2	NA
		8/1	12	<10	3±3	<3	NA

[a] 11, pasteurized milk; 12, raw milk from Grade A producer(s); 13, raw milk from family cow(s).
[b] Two-sigma counting error provided when available.
[c] Small sample size increased minimum detectable level.
A, Alternate milk sampling station.
NA, not analyzed.

fected area is conducted to determine radionuclide concentrations and to take protective action, if required. Additional sampling networks are operated in support of AEC operations in areas other than the NTS when requested. A complete description of sampling and analytical procedures was included with the milk results reported in the December 1972 issue of *Radiation Data and Reports*.

Results

The analytical results of all milk samples collected in July, August, and September 1972 by NERC-LV surveillance programs are listed in table 1. With the exception of cesium-137 at levels near the minimum detectable activity (MDA) (10 pCi/liter), no gamma-emitting fission products were detected in any of the samples by gamma spectroscopy analysis. Levels of tritium, strontium-89, and strontium-90 near the MDA's for these radionuclides (~ 200 pCi/liter, 2 pCi/liter, and 1 pCi/liter, respectively) were also measured by radiochemistry analyses. Copies of these results were distributed to EPA Regional Offices and appropriate State agencies prior to publication.

Food and Diet Surveillance

Efforts are being made by various Federal and State agencies to estimate the dietary intake of selected radionuclides on a continuing basis. These estimates, along with the guidance developed by the Federal Radiation Council, provide a basis for evaluating the significance of radioactivity in foods and diet.

Networks presently in operation and reported routinely include those listed below. These networks provide data useful for developing estimates of nationwide dietary intakes of radionuclides. Programs reported in *Radiation Data and Reports* are as follows:

Program	Period reported	Issue
California Diet Study	January–June 1971	December 1972
Carbon-14 in Total Diet and Milk	July–December 1971	May 1972
Connecticut Standard Diet	January–December 1971	December 1972
	This network has been discontinued	
Institutional Total Diet	October–December 1971 and 1971 Annual Summary	June 1972
Radiostrontium in Milk	January–December 1971	November 1972
Strontium-90 in Tri-City Diets	January–December 1971	December 1972

SECTION II. WATER

The Environmental Protection Agency and other Federal, State, and local agencies operate extensive water quality sampling and analysis programs for surface, ground, and treated water. Most of these programs include determinations of gross beta and gross alpha radioactivity and specific radionuclides.

Although the determination of the total radionuclide intake from all sources is of primary importance, a measure of the public health importance of radioactivity levels in water can be obtained by comparison of the observed values with the Public Health Service Drinking Water Standards (*1*). These standards, based on consideration of Federal Radiation Council (FRC) recommendations (*2–4*) set the limits for approval of a drinking water supply containing radium-226 and strontium-90 at 3 pCi/liter and 10 pCi/liter, respectively. Higher concentrations may be acceptable if the total intake of radioactivity from all sources remains within the guides recommended by FRC for control action. In the known absence[1] of strontium-90 and alpha-particle emitters, the limit is 1,000 pCi/liter gross beta radioactivity, except when additional analysis indicates that concentrations of radionuclides are not likely to cause exposures greater than the limits indicated by the Radiation Protection Guides. Surveillance data from a number of Federal and State programs are published periodically to show current and long-range trends. Water sampling activities reported in *Radiation Data and Reports* are listed below.

[1] Absence is taken to mean a negligibly small fraction of the specific limits of 3 pCi/liter and 10 pCi/liter for unidentified alpha-particle emitters and strontium-90, respectively.

Water sampling program	Period reported	Issue
California	January–December 1970	June 1972
Colorado River Basin	1968	March 1972
Community Water Supply Study	1969	September 1972
Florida	1969	January 1972
Interstate Carrier Drinking Water	1971	May 1972
Kansas	January–December 1971	February 1973
Michigan	January–June 1970	November 1971
Minnesota Municipal Water	July 1970–June 1971	November 1972
New York	July–December 1970 and January–June 1971	May 1972
North Carolina	1968–1970	September 1972
Radiostrontium in Tap Water	July–December 1971	November 1972
Tritium Surveillance System	July–September 1972	February 1973
Washington	July 1969–June 1970	March 1972
Water Surveillance Programs	April–June 1972	February 1973

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(*2*) FEDERAL RADIATION COUNCIL. Radiation Protection Guidance for Federal Agencies. Memorandum for the President, September 1961. Reprint from the Federal Register of September 26, 1961.

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(*4*) FEDERAL RADIATION COUNCIL. Background material for the development of Radiation Protection Standards, Report No. 2. Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (September 1961).

Gross Radioactivity in Surface Waters of the United States June–September 1972

Office of Water Planning and Standards
U.S. Environmental Protection Agency

The monitoring of gross radioactivity in surface waters of the United States was initiated in 1957 as part of the Water Pollution Surveillance System (formerly National Water Quality Network) of the U.S. Public Health Service. Currently, the program is operated by the U.S. Environmental Protection Agency, Office of Water Planning and Standards. Regional offices of the Environmental Protection Agency are responsible for the collection and retrieval system. Radioactivity analysis was performed in the centralized laboratories of the Office of Water Planning and Standards (Cincinnati, Ohio).

The regular reporting of gross radioactivity data in *Radiological Health Data and Reports* was terminated with the publication of data for October 1968 (April 1969 issue). With the publication of data for January 1971, this activity was resumed as a monthly report series. The unpublished data for the time interval of November 1968 through December 1970 will be the subject of a future summary article.

Tables 1 through 4 present the gross alpha and beta radioactivity results for samples collected from rivers during June through September 1972. The analytical procedures used for determining gross alpha and beta radioactivity are described in the 13th Edition of *Standard Methods for the Examination of Water and Wastewater* (*1*). Results are collected for the date of counting and are not corrected to the date of collection. The sensitivity in counting is that defined by the National Bureau of Standards Handbook 86 (*2*) and is calculated to be <0.2 pCi/liter for gross alpha radioactivity and <1 pCi/liter for gross beta radioactivity measurements.

REFERENCES

(*1*) AMERICAN PUBLIC HEALTH ASSOCIATION; AMERICAN WATER WORKS ASSOCIATION AND WATER POLLUTION CONTROL FEDERATION. Standard methods for the examination of water and wastewater, 13th Edition, New York, N.Y. (1971).

(*2*) U.S. DEPARTMENT OF COMMERCE. Radioactivity, Recommendations of the International Commission on Radiological Units and Measurements (1962), NBS Handbook 86 (November 29, 1963).

Table 1. Gross radioactivity in U.S. surface waters, June 1972

River and station	Number of grab samples	Gross alpha radioactivity (pCi/liter)		Gross beta radioactivity (pCi/liter)	
		Suspended solids	Dissolved solids	Suspended solids	Dissolved solids
Allegheny River:					
Pittsburgh, Pa	2	<0.2	<0.4	<1	5
		.4	<.3	<1	2
Animas River:					
Durango, Colo	1	<1.9	.9	32	2
Bear River:					
Idaho-Utah State Line	1	<.4	<1.0	4	10
Beaver River:					
New Brighton, Pa	1	<.3	<.6	<1	9
Big Sandy River:					
Wayne Co., W. Va	1	1.3	<.3	5	1
Clinch River:					
Kingston, Tenn	3	7.4	<1.0	18	7
		2.2	1.2	2	2
		<.3	<.4	<1	5
Colorado River:					
DeBeque, Colo	1	.8	<.7	6	10
Lake Granby, Colo	1	<.3	.3	<1	3
Lee's Ferry, Ariz	1	<.3	5.7	2	15
Moab, Utah:					
Highway bridge	4	<2.9	<1.1	37	12
		6.3	2.3	24	9
		7.6	3.7	28	18
		1.5	3.9	10	15
Above Mill Creek, Utah	4	5.0	2.2	27	12
		.2	2.4	28	13
		8.6	2.2	32	11
		3.7	5.8	9	18
Silt, Colo	1	.5	1.0	4	7
Detroit River:					
Detroit, Mich	1	<.3	<.5	2	3
Trenton, Mich	1	.3	.4	3	4
Dolores River:					
Bedrock, Colo	4	<.7	<.7	9	4
		<2.2	<.6	29	5
		1.1	1.7	7	10
		.4	6.5	4	25
Gateway, Colo	5	3.8	2.3	17	10
		<2.9	<1.0	25	10
		2.2	4.8	11	30
		.6	3.0	4	34
		1.0	4.6	5	25
Guyandotte River:					
Guyandotte, W. Va	1	1.0	<.4	5	3
Kanawha River:					
Mason, W. Va	1	<.3	.5	<1	5
Winfield Dam, W. Va	1	<.2	<.3	2	3
Mississippi River:					
Burlington, Iowa	1	<.3	<.3	2	4
Missouri River:					
Huron, S. Dak	1	3.1	<1.2	15	26
Omaha, Nebr	1	2.4	6.4	21	19
Yankton, S. Dak	1	<.3	2.3	3	15
Monongahela River:					
Pittsburgh, Pa	2	1.3	<.5	<2	5
		<.2	<.5	<1	3
Muskingum River:					
Lock & Dam #2, Ohio	1	<.2	<1.4	<1	16
North Platte River:					
Henry, Nebr	1	.3	18.6	4	43
Ohio River:					
Addison, Ohio	1	3.0	2.1	9	2
Boyd Co., Ky	1	1.1	<.5	4	5
Cincinnati, Ohio	4	.6	1.5	10	8
		1.0	<.8	3	5
		<.3	<.7	3	8
		3.1	<.4	12	6
Gallipolis, Ohio	1	.5	<.4	<1	8
Hancock, W. Va	1	<.2	<.4	<1	3
Kyger Creek, W. Va	1	.6	<.6	<2	4
Marietta, Ohio	1	.5	<.4	<1	3
New Martinsville, W. Va	1	.3	<.5	<1	3
Old Lock, W. Va	1	<.2	<.4	<1	2
South Heights, Pa	1	.3	<.4	<1	4
Warwood, W. Va	1	<.2	<.6	<1	5
Platte River:					
Plattsmouth, Nebr	1	6.8	4.0	28	22
Roanoke River:					
John Kerr Dam, Va	4	<.3	<.3	2	3
		<.4	.9	3	2
		<.3	<.4	3	5
		.4	<.3	2	4
San Miguel River:					
Uravan, Colo	4	<1.5	2.0	14	5
		<2.7	<.8	32	7
		2.7	.5	12	6
		<.3	1.4	2	6

Table 1. Gross radioactivity in U.S. surface waters, June 1972—continued

River and station	Number of grab samples	Gross alpha radioactivity (pCi/liter)		Gross beta radioactivity (pCi/liter)	
		Suspended solids	Dissolved solids	Suspended solids	Dissolved solids
Below Uravan, Colo	5	<1.9	<1.1	22	8
		6.2	<1.0	93	8
		6.5	1.4	32	13
		.6	2.5	7	11
		2.1	4.0	8	14
Naturita, Colo	5	4.4	1.0	17	3
		13.2	1.1	27	4
		.6	1.0	4	6
		.4	<.5	4	7
		<.3	.8	2	5
St. Clair River:					
Port Huron, Mich	1	<.3	<.4	3	3
St. Lawrence River:					
Massena, N.Y	3	<.4	<.6	5	3
		.5	.7	3	7
		<.3	<.5	3	6
St. Mary's River:					
Sault Ste. Marie, Mich	1	<.3	<.4	3	2
White River:					
Watson, Utah	1	<2.7	<1.2	24	11

Table 2. Gross radioactivity in U.S. surface waters, July 1972

River and station	Number of grab samples	Gross alpha radioactivity (pCi/liter)		Gross beta radioactivity (pCi/liter)	
		Suspended solids	Dissolved solids	Suspended solids	Dissolved solids
Clinch River:					
Kingston, Tenn	1	<0.3	2.4	<1	<2
Colorado River:					
Moab, Utah:					
Highway bridge	3	1.5	5.6	11	17
		<.3	10.3	2	14
		<.3	12.3	2	21
Above Mill Creek, Utah	3	1.9	2.4	7	17
		.3	7.1	<2	4
		.6	15.2	1	30
Lee's Ferry, Ariz	1	<.3	6.9	<1	16
Dolores River:					
Bedrock, Colo	4	.4	9.0	19	22
		.4	4.8	2	29
		<.3	7.7	1	35
		2.7	5.2	9	36
Gateway, Colo	4	1.3	6.8	9	15
		14.9	8.6	36	29
		5.5	17.5	15	44
		21.4	6.2	46	57
Lake Utah:					
Spanish Fork, Utah	1	.3	<2.4	2	8
Little Medicine Bow River:					
Heward Ranch, Wyo	1	.3	13.7	<1	31
Near Shirley Basin, Wyo	1	3.8	26.3	28	30
Above Seminole Reservoir, Wyo	1	.6	29.1	3	67
Mississippi River:					
Burlington, Iowa	1	.7	2.5	6	8
Ohio River:					
Cincinnati, Ohio	4	1.9	<.4	9	4
		.9	<.5	6	5
		.4	<.5	1	4
		<.3	<.6	<1	3
Powder River:					
Near Arvada, Wyo	1	6.6	12.6	15	37
Provo River:					
Provo, Utah	1	<.3	1.5	<1	6
Roanoke River:					
John Kerr Dam, Va	3	.9	<.3	5	4
		.6	<.3	3	4
		.5	<.3	2	4
San Juan River:					
Bluff, Ariz	1	.8	3.8	16	22
San Miguel River:					
Uravan, Colo	4	4.4	4.2	12	10
		.8	3.1	5	10
		.3	3.9	2	11
		3.7	6.2	19	17
Below Uravan, Colo	4	3.9	5.1	14	10
		.5	6.4	4	14
		.3	14.8	3	25
		7.4	8.7	16	33

Table 2. Gross radioactivity in U.S. surface waters, July 1972—continued

River and station	Number of grab samples	Gross alpha radioactivity (pCi/liter)		Gross beta radioactivity (pCi/liter)	
		Suspended solids	Dissolved solids	Suspended solids	Dissolved solids
Naturita, Colo.	4	.9	<.9	5	6
		<.3	2.5	<1	5
		<.3	3.5	1	4
		<.3	<1.2	1	6
St. Lawrence River:					
Massena, N.Y.	3	<.3	<.6	2	5
		<.4	<.5	3	5
		<.3	<.7	1	2
White River:					
Watson, Utah	1	<.3	2.3	2	9

Table 3. Gross radioactivity in U.S. surface waters, August 1972

River and station	Number of grab samples	Gross alpha radioactivity (pCi/liter)		Gross beta radioactivity (pCi/liter)	
		Suspended solids	Dissolved solids	Suspended solids	Dissolved solids
Bear River:					
Utah-Idaho State Line, Utah	1	<0.3	1.6	1	13
Clinch River:					
Kingston, Tenn.	4	<.3	.5	<1	6
		<.3	<.4	<1	7
		<.2	<.3	1	4
		<.2	<.3	<1	2
Colorado River:					
DeBeque, Colo.	1	<.3	<.2	<2	<6
Moab, Utah Highway bridge	5	2.5	13.4	8	34
		4.0	8.3	11	23
		<.3	18.4	2	23
		4.0	19.4	13	22
		4.4	22.4	12	36
Above Mill Creek, Utah	5	<.7	6.7	11	23
		3.8	13.3	15	28
		2.2	16.9	11	34
		2.3	19.9	11	43
		3.9	16.8	19	42
Silt, Colo.	1	<.3	2.7	1	7
Dolores River:					
Bedrock, Colo.	4	.5	12.1	4	27
		.9	12.1	4	30
		<.9	22.5	13	39
		1.1	10.6	9	23
Gateway, Colo.	5	1.8	12.4	6	35
		1.6	20.4	6	56
		4.2	21.5	12	83
		1.6	13.3	10	74
		2.0	15.2	9	83
Green River:					
Greendale, Utah	1	<.3	2.1	<1	12
LaBarge, Wyo.	1	<.3	<.4	<1	3
Little Medicine Bow River:					
Heward Ranch, Wyo.	1	1.1	12.1	<1	22
Above Seminole Reservoir, Wyo.	1	2.9	78.0	13	21
Near Shirley Basin, Wyo.	1	3.4	92.2	28	528
Ohio River:					
Cincinnati, Ohio	5	.4	<.6	<1	4
		.4	<.4	2	3
		<.2	<.2	<1	10
		<.2	<.4	<1	7
		<.3	<.2	<1	<1
Roanoke River:					
John Kerr Dam, Va.	3	<.3	<.3	<1	4
		<.2	<.3	<1	8
		<.2	<.5	<1	5
San Miguel River:					
Uravan, Colo.	5	<.3	7.1	1	12
		<.3	5.9	<1	19
		<.2	6.2	<1	17
		<.3	7.6	<1	14
		.8	5.7	5	20
Below Uravan, Colo.	5	1.4	4.5	3	20
		1.7	6.9	4	31
		1.5	41.9	4	56
		2.9	23.9	18	49
		.8	29.6	5	46
Naturita, Colo.	5	<.3	3.5	1	16
		<.3	5.5	<1	17
		<.2	<3.4	<1	15
		<.3	4.1	<1	17
		<.3	3.8	<1	15
St. Lawrence River:					
Massena, N.Y.	3	<.3	<.5	1	11
		<.3	<.5	1	5
		<.2	<.4	2	4

Table 4. Gross radioactivity in U.S. surface waters, September 1972

River and station	Number of grab samples	Gross alpha radioactivity (pCi/liter)		Gross beta radioactivity (pCi/liter)	
		Suspended solids	Dissolved solids	Suspended solids	Dissolved solids
Animas River:					
Durango, Colo.	1	<0.4	<0.7	<1	4
Colorado River:					
Colorado-Utah State Line	1	4.1	15.9	27	26
Moab, Utah Highway bridge	4	7.5	18.3	18	27
		5.3	9.3	15	34
		28.6	1.5	35	11
		5.0	7.7	20	21
Above Mill Creek, Utah	4	4.4	20.4	17	25
		6.9	16.6	25	31
		14.1	1.1	38	12
		5.7	8.8	29	25
Lake Granby, Colo.	1	<.3	<.3	<1	2
Dolores River:					
Bedrock, Colo.	4	14.9	4.0	20	18
		1.6	12.4	7	42
		2.3	21.6	8	60
		2.5	15.6	10	33
Gateway, Colo.	4	12.9	28.1	23	67
		15.6	31.9	48	79
		36.4	10.7	81	36
		18.0	18.6	43	55
Little Medicine Bow River:					
Heward Ranch, Wyo.	1	.4	7.3	5	14
Seminole Reservoir, Wyo.	1	5.2	17.6	18	34
Shirley Basin, Wyo.	1	7.7	27.4	6	31
Ohio River:					
Cincinnati, Ohio	4	<.3	<.6	2	4
		.4	<.6	<1	5
		<.3	<.3	<1	6
		<.3	<.9	<1	6
Roanoke River:					
John Kerr Dam, Va.	2	<.3	<.3	<1	5
		<.3	<.3	1	3
San Miguel River:					
Uravan, Colo.	4	12.9	5.4	1	20
		6.9	7.1	22	15
		2.4	<3.1	8	14
		.7	4.5	3	10
Below Uravan, Colo.	4	2.7	25.4	10	41
		3.5	11.3	16	26
		.6	12.1	3	22
Naturita, Colo.	3	.9	9.4	7	18
		.6	3.3	<1	8
		<.4	2.7	1	7
		<.3	<4.2	1	20
St. Lawrence River:					>
Massena, N. Y.	3	.3	<.6	<1	6
		<.3	<.6	<1	6
		<.3	<.5	<1	3
Virgin River:					
St. George, Utah	1	25.7	17.3	121	58

Water Surveillance Programs, July–September 1972

National Environmental Research Center—
Las Vegas, Environmental Protection Agency

The Water Surveillance Network, operated by the National Environmental Research Center-Las Vegas (NERC-LV),[1] consist of 90 sampling locations (figures 1 and 2) situated in the offsite area surrounding the Nevada Test Site (NTS). This routine network is operated in support of the nuclear testing programs sponsored by the U.S. Atomic Energy Commission (AEC) and by the Space Nuclear Systems Office, National Aeronautical and Space Administration.

[1] This network is operated under a Memorandum of Understanding (No. AT(26-1)-539) with the Nevada Operations Office, AEC, Las Vegas, Nev.

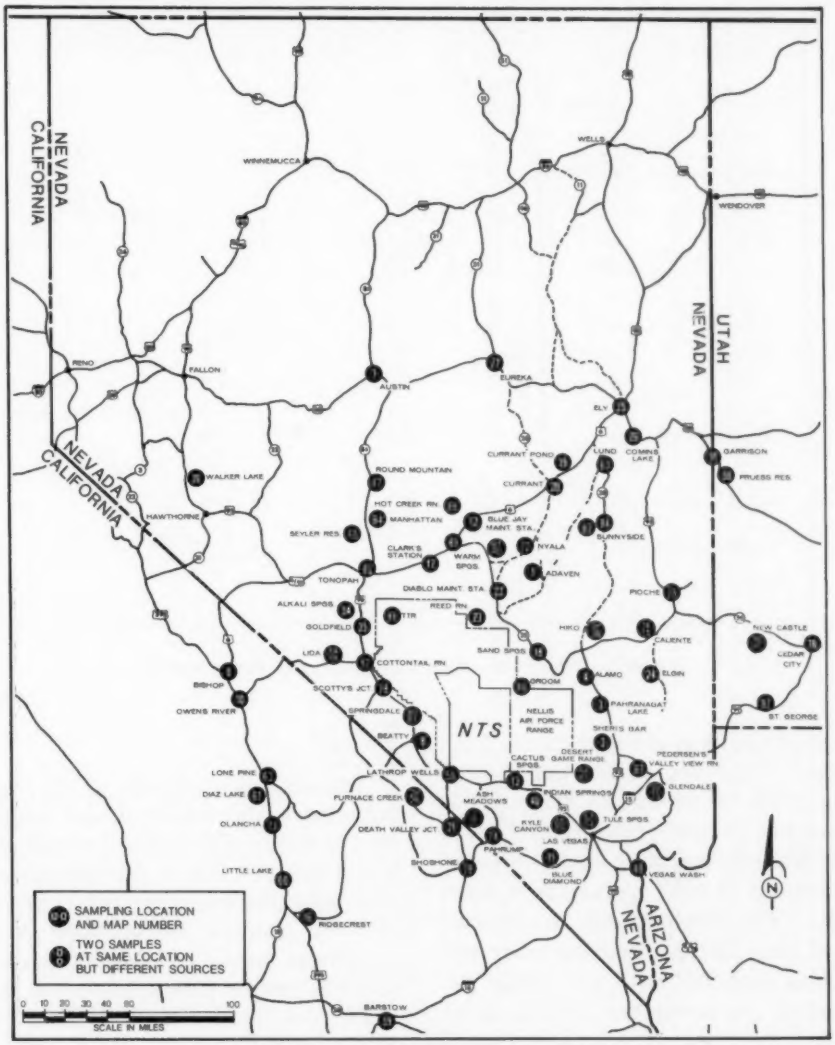

Figure 1. Water Surveillance Network

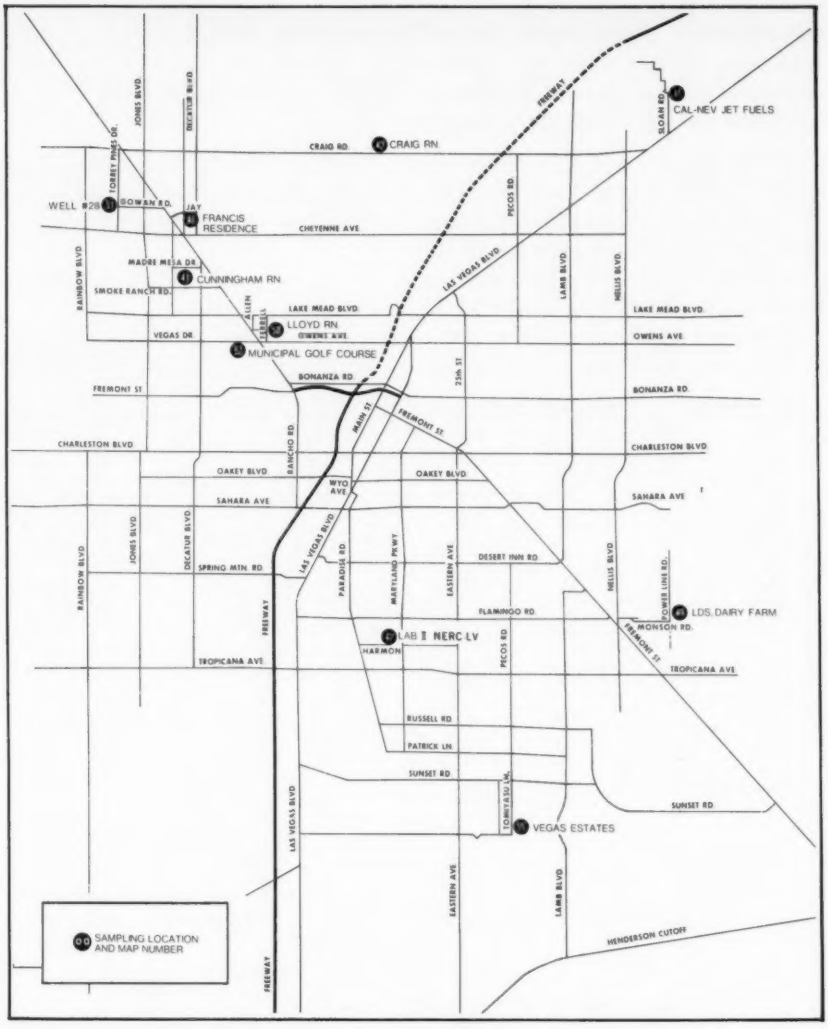

Figure 2. Water Surveillance Network, Las Vegas Valley

In the event of a release of radioactivity from the NTS, special sampling within the affected area is conducted to determine radionuclide concentrations and to take protective action, if required. Additional sampling networks are operated in support of AEC operations in areas other than the NTS when requested. A complete description of sampling and routine analytical procedures was included with the water results reported in the December 1972 issue of *Radiation Data and Reports.*

Results

The analytical results of all water samples collected in July, August, and September 1972 by the NERC-LV Water Surveillance Network are listed in table 1. No gamma-emitting fission products were detected in any of the samples by gamma spectroscopy analysis. The analytical results of samples selected for special analyses will be reported at a later date.

For the purpose of identifying the source of the gross radioactivity in all network samples

Table 1. NERC-LV water surveillance results, July–September 1972

Location	Map number	Data collected 1972	Radioactivity concentration [a] (pCi/liter)			
			Sample type [b]	Gross alpha	Gross beta	Tritium
California:						
Bishop:						
Fish and Game Office	9	7/6	23	<1.8	<3.4	NA
		8/2	23	<1.6	10± 4	NA
		9/6	23	<2.2	<3.1	NA
Owens River, 3 miles east	10	7/6	22	<3.1	<3.5	NA
		8/2	22	<3.3	5± 3	NA
		9/6	22	9± 5	7± 3	NA
Death Valley Junction:						
Lila's Cafe	21	7/5	23	14± 7.8	10± 4	<200
		8/3	23	6± 6	9± 4	<200
		9/8	23	12± 8.7	9± 4	<210
Furnace Creek:						
Pond	28	7/5	21	8± 6	8± 4	NA
		8/3	21	<5.5	9± 4	NA
		9/8	21	<6.3	12± 3.9	NA
Visitors Center	29	7/5	27	7± 5	9± 4	NA
		8/3	27	<4.4	16± 4.2	NA
		9/8	27	<6.2	11± 3.8	NA
Hinkley:						
Bill Nelson Dairy	39	7/3	23	9± 4	9± 4	NA
		8/1	23	12± 6.8	9± 4	NA
		9/5	23	<6.9	10± 4	NA
Little Lake:						
Little Lake Ranch	60	7/7	21	<7.1	21± 4.8	NA
		8/1	21	27±10	32± 5	NA
		9/5	21	19± 9.2	19± 4.2	NA
Lone Pine:						
Diaz Lake	61	7/5	21	25± 9.2	21± 4.6	NA
		8/2	21	27± 9.5	26± 4.7	NA
		9/5	21	24± 9.4	29± 4.7	NA
Forest Service Ranger Station	62	7/5	23	<2.1	<3.5	NA
		8/2	23	<1.8	4± 3	NA
		9/5	23	<2.6	<3.1	NA
Olancha:						
Haiwee Reservoir	73	7/7	21	5± 3	6± 4	NA
		8/1	21	5± 4	5± 3	NA
		9/5	21	8± 4	11± 3.6	NA
Ridgecrest:						
City Hall	76	7/7	23	<4.2	<3.5	NA
		8/1	23	7± 5	5± 3	NA
		9/5	23	4± 4	<3.1	NA
Shoshone:						
Chevron Service Station	79	7/5	27	7± 6	19± 4.4	NA
		8/3	27	<5.3	18± 4.4	NA
		9/8	27	<7.4	15± 4.1	NA
Nevada:						
Adaven:						
Canfield Ranch	1	7/6	22	5± 3	4± 3	NA
		8/2	22	<3.3	4± 3	NA
		9/7	22	4± 4	4± 3	NA
Alamo:						
Sheri's Bar	2	7/5	23	<3.0	5± 3	NA
		8/1	23	<3.9	4± 3	NA
		9/5	23	<4.8	7± 3	NA
Pahranagat Lake	3	7/5	21	12± 7.0	30± 4.7	NA
		8/1	21	22± 9.2	35± 5.0	NA
		9/5	21	30±11	37± 5.1	NA
Williams Dairy	4	7/5	23	<4.9	15± 3.9	NA
		8/1	23	8± 5	12± 3.9	NA
		9/5	23	<5.9	13± 3.9	NA
Ash Meadows:						
Ash Meadows Lodge	5	7/11	23	<6.3	16± 4.1	380±230
		8/2	23	10± 6.8	15± 4.2	220±200
		9/2	23	6± 6	16± 4.0	<230
Ash Meadows Pond	6	7/11	21	<6.3	23± 4.5	NA
		8/2	21	7± 5	22± 4.5	NA
		9/2	21	14± 7.1	23± 4.3	NA
Austin:						
County Courthouse	7	7/13	27	24± 6.5	24± 4.3	NA
		8/1	27	<3.3	<3.1	NA
		9/7	27	30± 7.5	15± 3.8	NA
Beatty:						
Richfield Service Station	8	7/10	23	9± 6	10± 4	240±220
		8/2	23	10± 6	9± 4	<200
		9/1	23	5± 5	7± 3	<230
Blue Diamond:						
Post Office	11	7/11	23	<3.6	13± 2.4	<220
		8/3	23	9± 5	<3.3	<200
		9/6	23	<4.0	4± 3	<230
Blue Jay Highway Maintenance Station	12	7/6	23	<3.8	9± 3	NA
		8/1	23	<3.7	5± 3	NA
		9/7	23	<4.2	5± 3	NA

See footnotes at end of table.

Table 1. NERC-LV water surveillance results, July-September 1972—continued

Location	Map number	Data collected 1972	Radioactivity concentration [a] (pCi/liter)			
			Sample type [b]	Gross alpha	Gross beta	Tritium
Nevada—continued						
Cactus Springs:						
Mobile Service Service	13	7/13	27	<2.7	<3.1	360 ±220
		8/1	27	3± 2	<3.3	200 ±200
		9/5	27	4± 3	<2.9	<230
Caliente:						
Agricultural Extension Station	14	7/6	23	5± 4	4± 3	NA
		8/2	23	<3.1	7± 3	NA
		9/6	23	11± 5.7	5± 3	NA
Meadow Valley Wash	15	7/6	22	6± 5	13± 3.8	NA
		8/2	22	10± 5.6	13± 3.9	NA
		9/7	22	12± 7.3	12± 3.8	NA
Clark Station:						
Five-Mile Ranch	17	7/6	27	<3.5	<3.3	NA
		8/1	27	<3.0	5± 3	NA
		9/7	27	5± 4	6± 3	NA
Coyote Summit:						
Sand Spring Well	18	7/6	23	<3.4	8± 3	NA
		8/2	23	6± 4	13± 3.7	NA
Currant:						
Currant Pond	19	7/12	21	10± 5	8± 4	NA
		8/2	21	<3.8	7± 4	NA
		9/7	21	10± 5.8	4± 3	NA
Currant Ranch Cafe	20	7/12	27	14± 5.9	<3.3	NA
		8/2	27	6± 5	4± 3	NA
		9/7	27	7± 6	6± 3	NA
Diablo Highway Maintenance Station	22	7/6	23	<3.5	5± 3	NA
		8/2	23	4± 4	9± 3	NA
		9/6	23	<4.1	6± 3	NA
Diablo:						
Reed Ranch	23	7/5	21	<5.3	9± 4	NA
		8/1	21	22± 8.2	43± 5.2	NA
		9/6	21	35± 9.3	9± 4	NA
Elgin:						
Water tower	24	7/6	23	15± 7.0	11± 3.8	NA
		8/3	23	6± 5	9± 4	NA
		9/7	23	7± 6	10± 3.6	NA
Ely:						
Chevron Service Station	25	7/10	24	6± 4	4± 3	NA
		8/1	24	5± 3	<3.1	NA
		9/6	24	<3.3	<3.2	NA
Comins Lake	26	7/14	21	<7.1	13± 3.9	NA
		8/1	21	13± 7.5	49± 5.6	NA
		9/6	21	12± 8.0	59± 6	NA
Eureka:						
Chevron Service Station	27	7/13	24	<3.1	<3.3	NA
		8/1	24	7± 4	4± 3	NA
		9/7	24	<4.9	<3.2	NA
Glendale:						
Chevron Service Station	32	7/5	27	10± 6	16± 4.0	NA
		8/1	27	<5.1	9± 4	NA
		9/5	27	<5.9	9± 4	NA
Muddy River	33	7/5	22	<8.0	13± 4.0	NA
		8/1	22	10± 6	9± 4	NA
		9/5	22	<6.8	17± 4.2	NA
Goldfield:						
Alkali Springs	34	7/10	21	<7.7	28± 4.9	NA
		8/1	21	<6.7	30± 5.2	NA
		9/5	21	<8.2	22± 4.5	NA
Chevron Service Station	35	7/10	23	6± 5	5± 3	NA
		8/1	23	<4.7	4± 3	NA
		9/5	23	<5.1	4± 3	NA
Hawthorne:						
Walker Lake	36	9/8	21	<24	390 ±27	NA
Hiko:						
Crystal Springs	37	7/5	27	<4.5	6± 3	NA
		8/1	27	9± 5	7± 3	NA
		9/5	27	8± 5	6± 3	NA
Schofield Dairy	38	7/5	23	31± 9.5	35± 4.9	NA
		8/1	23	30± 9.2	39± 5.2	NA
		9/5	23	26± 9.3	36± 5.0	NA
Indian Springs:						
Chevron Service Station	40	7/13	23	<2.8	<3.1	<220
		8/1	23	14± 5.1	4± 3	<200
		9/5	23	4± 3	<3.3	<230
Las Vegas:						
Cal-Nev Jet Fuels	41	7/10	23	4± 3	10± 4	<200
		8/17	23	5± 4	3± 3	<270
		9/15	23	<3.8	4± 3	<230
Craig Ranch Golf Course	42	7/10	23	6± 3	5± 3	<200
		8/17	23	6± 4	6± 3	<270
		9/15	23	<4.1	5± 3	<230
Cunningham Ranch	43	7/10	23	<2.8	4± 3	<200
		8/17	23	<3.1	4± 3	<270
		9/15	23	<4.5	6± 3	<230

See footnotes at end of table.

Table 1. NERC-LV water surveillance results, July–September 1972—continued

Location	Map number	Data collected 1972	Radioactivity concentration [a] (pCi/liter)			
			Sample type [b]	Gross alpha	Gross beta	Tritium
Nevada—continued						
Desert Game Range	44	7/13	23	5± 3	11± 3.6	<220
		8/1	23	5± 3	<3.3	<220
		9/5	23	6± 4	4± 3	<230
Desert Game Range Pond	45	7/13	21	<2.7	<2.9	<220
		8/1	21	5± 3	<3.3	260 ±200
		9/5	21	5± 4	<3.1	<230
Francis Residence	46	7/10	23	<5.1	<3.2	200 ±200
		8/17	23	5± 5	<3.4	<270
		9/15	23	<6.3	5± 3	<230
Lab II, NERC-LV	47	7/10	24	<4.6	8± 4	1,000 ±210
		8/17	24	<5.6	8± 3	940 ±280
		9/15	24	<6.6	7± 4	400 ±230
Lake Mead Vegas Wash	48	7/11	21	6± 5	8± 3	950 ±230
		8/17	21	<5.7	8± 3	820 ±280
		9/15	21	<6.7	9± 4	950 ±240
LDS Dairy Farm	49	7/11	23	12± 8.6	18± 4.2	<220
		8/17	23	<9.2	13± 4.2	<270
		9/18	23	<9.4	16± 4.4	<200
Lloyd Ranch	50	7/10	23	7± 5	7± 3	200 ±200
		8/17	23	<5.6	6± 3	<270
		9/15	23	7± 7	6± 3	<230
LV Water District Well 28	51	7/10	23	4± 3	3± 3	<200
		8/17	23	<2.5	<3.3	<270
		9/15	23	<4.2	4± 3	<230
Municipal Golf Course	52	7/10	23	3± 3	7± 3	240 ±200
		8/17	23	4± 3	4± 3	<270
		9/15	23	<4.5	<3.2	<250
Tule Springs	53	7/13	23	<2.6	4± 3	<230
		8/1	23	4± 3	<3.3	<200
		9/5	23	<4.2	<3.3	<230
Tule Springs Pond	54	7/13	21	<2.9	4± 3	NA
		8/1	21	4± 3	<3.3	NA
		9/5	21	<2.1	4± 3	NA
Vegas Estates	55	7/10	23	<4.1	9± 4	<200
		8/17	23	<6.3	13± 3.8	<270
		9/15	23	<6.9	11± 3.8	<230
Lathrop Wells:						
Texaco Service Station	56	7/12	23	<4.2	6± 3	<230
		8/1	23	<3.5	<3.4	<200
		9/1	23	<6.1	<3.3	<230
Lida Junction:						
Cottontail Ranch	57	7/10	23	5± 5	14± 3.9	NA
		8/1	23	6± 5	15± 3.9	NA
		9/5	23	<6.7	11± 3.8	NA
Lida:						
Lida Livestock Company	58	7/10	27	5± 4	<3.1	NA
		8/1	27	4± 4	4± 3	NA
		9/5	27	<4.2	3± 3	NA
Pond at storage tank	59	7/10	21	<3.8	4± 3	NA
		8/1	21	<4.0	4± 3	NA
		9/5	21	<4.0	4± 3	NA
Lund:						
Gardner Grocery	63	7/11	23	6± 4	9± 4	NA
		8/3	23	5± 4	4± 3	NA
		9/6	23	<4.7	<3.2	NA
Manhattan:						
Country store	64	7/11	23	17± 7.1	10± 4	NA
		8/2	23	15± 6.9	7± 3	NA
		9/6	23	24± 8.4	10± 4	NA
Seyler Reservoir	65	9/6	21	38± 16	65± 6.9	NA
Mercury:						
Gordon Lake	66	7/5	23	<3	<1	NA
		8/1	23	5± 4	6± 3	NA
		9/6	23	<4.2	6± 3	NA
Moapa:						
Pedersen Valley View Ranch	67	7/5	27	8± 5	12± 3.7	NA
		8/1	27	<5.3	14± 3.9	NA
		9/5	27	<6.0	12± 3.9	NA
Mt. Charleston:						
Kyle Canyon Fire Station	68	7/13	27	<2.6	<2.9	420 ±220
		8/1	27	4± 3	<3.3	270 ±200
		9/5	27	<2.5	<2.9	290 ±230
Kyle Canyon Pond	69	7/13	21	<2.6	8± 3	280 ±230
		8/1	21	3± 3	11± 3.8	NA
		9/5	21	<2.5	10± 3.4	NA
Nyala:						
Sharp's Ranch	72	7/6	23	<3.1	3± 3	NA
		8/2	23	<3.2	5± 3	NA
		9/7	23	<3.5	5± 3	NA
Pahrump:						
Texaco Service Station	74	7/11	23	6± 4	4± 3	NA
		8/3	23	<3.3	3± 3	NA
		9/5	23	<2.4	<2.9	NA

See footnotes at end of table.

Table 1. NERC-LV water surveillance results, July–September 1972—continued

Location	Map number	Data collected 1972	Radioactivity concentration [a] (pCi/liter)			
			Sample type [b]	Gross alpha	Gross beta	Tritium
Nevada—continued						
Pioche:						
County Courthouse	75	7/6	24	<3.9	7± 3	NA
		8/2	24	<2.7	7± 3	NA
		9/6	24	<3.5	5± 3	NA
Round Mt:						
Mobile Service Station	77	7/12	27	<2.6	<3.1	NA
		8/1	27	3± 2	<3.3	NA
		9/6	27	<2.9	<3.1	NA
Scotty's Junction:						
Chevron Service Station	78	7/10	23	<5.3	12± 3.8	<200
		8/1	23	7± 5	10± 4	<200
		9/5	23	<6.3	13± 3.9	<210
Springdale:						
Peacock Ranch	80	7/11	27	<4.7	9± 4	<230
		8/2	27	6± 5	7± 4	<200
		9/1	27	<3.8	8± 3	<230
Pond	81	7/11	21	<5.1	12± 3.7	NA
		8/2	21	<4.4	11± 3.8	NA
		9/1	21	8± 5	9± 3	NA
Sunnyside:						
Adam McGill Reservoir	83	7/11	21	6± 4	16± 4.0	NA
		8/3	21	10± 5.0	7± 3	NA
		9/6	21	11± 5.6	11± 3.7	NA
Wildlife Management Headquarters	84	7/11	27	5± 3	10± 3.7	NA
		8/3	27	<3.1	4± 3	NA
		9/6	27	<4.6	<3.2	NA
Tonopah:						
Jerry's Chevron Station	85	7/11	23	4± 4	10± 4	NA
		8/2	23	6± 4	12± 3.9	NA
		9/6	23	<3.7	NA	NA
Tonopah Test Range CP–1	86	7/11	23	6± 5	7± 3	NA
		8/2	23	<4.5	7± 3	NA
		9/5	23	<4.6	6± 3	NA
Warm Springs:						
Fallini's Pond	87	7/6	21	30±13	98± 7.9	NA
		8/2	21	NA	NA	NA
		9/6	21	13±10	70± 6.7	NA
Hot Creek Ranch	88	7/6	27	7± 5	20± 4.3	NA
		8/1	27	<5.8	12± 3.8	NA
		9/7	27	<5.8	18± 4.1	NA
Service Station and Cafe	89	7/5	27	30± 9.7	27± 4.6	NA
		8/2	27	28±10	25± 4.5	NA
		9/7	27	13± 7.9	28± 4.7	NA
Twin Springs Ranch	90	7/6	23	13± 6.3	13± 3.8	NA
		8/2	23	<3.0	<3.4	NA
		9/7	23	19± 7.3	13± 3.8	NA
Utah:						
Cedar City:						
M. D. Baldwin Reservoir	16	7/6	24	<2.6	10± 2	NA
		8/1	24	4± 3	3± 3	NA
		9/6	24	15± 6.7	13± 3.8	NA
Garrison:						
Pruess Reservoir	30	9/6	21	21± 8.9	16± 4.1	NA
Rowley Grocery	31	7/13	23	4± 3	7± 3	NA
		8/1	23	<3.4	4± 3	NA
		9/6	23	5± 4	<3.2	NA
Newcastle:						
Municipal Reservoir	70	7/7	21	17± 5.7	11± 3.6	NA
		8/1	21	14± 5.5	13± 4.0	NA
		9/6	21	<3.2	3± 3	NA
Newcastle Diary	71	7/6	24	<3.6	18± 2.8	NA
		8/1	24	5± 4	8± 4	NA
		9/7	24	<6.4	5± 3	NA
St. George:						
R. Cox Diary	82	7/5	24	<3.8	7± 3	NA
		8/1	24	4± 2	<3.3	NA
		9/5	24	<2.4	<3.1	NA

[a] Two-sigma counting error provided when available.
NA, no analysis.
NS, no sample.

[b] 21–Pond, lake, reservoir, stock tank, stock pond.
22–Stream, river, creek.
23–Well
24–Multiple supply mixed (a water sample consisting of mixed or multiple sources of water, such as well and spring).
27–Spring

and comparing sample concentrations with both the AEC concentration guides and the PHS drinking water standards, selected samples will be given special analyses at least once a year beginning with samples taken during calendar year 1972. For surface water samples, the special analyses will include strontium-89, strontium-90, plutonium-238, plutonium-239, uranium, and radium-226. For surface water samples, the analyses will include strontium-89, strontium-90, uranium, and radium-226.

Copies of these results are distributed to EPA Regional Offices and appropriate State agencies prior to publication.

SECTION III. AIR AND DEPOSITION

Radioactivity in Airborne Particulates and Precipitation

Continuous surveillance of radioactivity in air and precipitation provides one of the earliest indications of changes in environmental fission product radioactivity. To date, this surveillance has been confined chiefly to gross beta radioanalysis. Although such data are insufficient to assess total human radiation exposure from fallout, they can be used to determine when to modify monitoring in other phases of the environment.

Surveillance data from a number of programs are published monthly and summarized periodically to show current and long-range trends of atmospheric radioactivity in the Western Hemisphere. These include data from activities of the Environmental Protection Agency, the Canadian Department of National Health and Welfare, the Mexican National Institute of Nuclear Energy, and the Pan American Health Organization.

In addition to those programs presented in this issue, the following programs were previously covered in *Radiation Data and Reports.*

Network	Period	Issue
Fallout in the United States and other areas, *HASL*	January–December 1970	December 1971
Mexican air monitoring program	May–August 1972	January 1973
Plutonium in airborne particulates	April–June 1972	January 1973
Surface air sampling program, 80th Meridian Network, *HASL*	January–December 1969	February 1972

1. Radiation Alert Network, November 1972

Division of Atmospheric Surveillance
Environmental Protection Agency

Surveillance of atmospheric radioactivity in the United States is conducted by the Radiation Alert Network (RAN) which regularly gathers samples at 69 locations distributed throughout the country (figure 1). Most of the stations are operated by State health department personnel.

The station operators perform "field estimates" on the airborne particulate samples at 5 hours after collection, when most of the radon daughter products have decayed, and at 29 hours after collection, when most of the thoron daughter products have decayed. They also perform field estimates on dried precipitation samples and report all results to appropriate Environmental Protection Agency officials by mail or telephone depending on levels found. A compilation of the daily field estimates is available upon request from the Air Quality Information Systems Branch, Division of Atmospheric Surveillance, EPA, Research Triangle Park, N. C. 27711. A detailed description of the sampling and analytical procedures was presented in the March 1968 issue of *Radiological Health Data and Reports.*

Table 1 presents the monthly average gross beta radioactivity in surface air particulates and deposition by precipitation, as measured by the field estimate technique, during November 1972.

High readings were reported in precipitation samples for the following station: Richmond, Va.—20 nCi/m².[1] All other field estimates reported were within normal limits for the reporting station.

[1] This value is suspect due to operational procedures.

Figure 1. Radiation Alert Network sampling stations

Table 1. Gross beta radioactivity in surface air and precipitation, November 1972

Station location		Number of samples	Gross beta radioactivity (5-hour field estimate) (pCi/m³)			Number of samples	Precipitation			
			Maximum	Minimum	Average [a]		Total depth (mm)	Field estimation of deposition		
								Number of samples	Depth (mm)	Total deposition (nCi/m²)
Ala:	Montgomery	20	1	0	0	4	85	4	85	9
Alaska:	Anchorage	3	0	0	0	0				
	Attu Island	30	0	0	0	0				
	Fairbanks	0				0				
	Juneau	0				0				
	Nome	0				0				
	Point Barrow	0				0				
Ariz:	Phoenix	19	10	1	4	0				
Ark:	Little Rock	13	1	0	0	0				
Calif:	Berkeley	19	1	0	0	7	150	7	150	0
	Los Angeles	20	2	0	1	0				
C.Z:	Ancon	14	0	0	0	0				
Colo:	Denver	20	2	0	1	2	7	[b]		
Conn:	Hartford	21	1	0	0	9	140	9	140	0
Del:	Dover	18	0	0	0	0				
D.C:	Washington	24	1	0	0	0				
Fla:	Jacksonville	20	2	0	0	8	110	8	110	0
	Miami	0				0				
Ga:	Atlanta	8	1	0	0	0				
Guam:	Agana	0				0				
Hawaii:	Honolulu	18	1	0	0	3	29	[b]		
Idaho:	Boise	21	4	9	1	3	25	3	25	2
Ill:	Springfield	13	2	0	0	0				
Ind:	Indianapolis	18	0	0	0	0				
Iowa:	Iowa City	18	1	0	0	4	50	4	50	0
Kans:	Topeka	19	1	0	1	8	70	8	70	1
Ky:	Frankfort	12	1	9	0	0				
La:	New Orleans	19	1	0	0	8	157	[b]		
Maine:	Augusta	21	1	0	0	7	118	7	118	0
Md:	Baltimore	20	1	0	0	6	53	6	53	0
Mass:	Lawrence	19	1	0	0	6	154	6	154	0
	Winchester	19	1	0	0	7	155	7	155	0
Mich:	Lansing	21	0	0	0	8	52	8	52	5
Minn:	Minneapolis	20	2	0	1	3	40	3	40	2
Miss:	Jackson	10	1	0	0	5	69	5	69	0
Mo:	Jefferson City	18	1	0	0	7	98	7	98	0
Mont:	Helena	13	2	0	1	1	9	1	9	0
Nebr:	Lincoln	21	2	0	1	5	96	5	96	16
Nev:	Las Vegas	19	5	0	2	0				
N.H:	Concord	0				0				
N.J:	Trenton	20	1	0	0	8	195	8	195	3
N. Mex:	Santa Fe	16	1	0	1	0				
N.Y:	Albany	14	1	0	1	0				
	Buffalo	20	0	0	0	0				
	New York City	0				0				
N.C:	Gastonia	17	9	1	3	2	48			
N. Dak:	Bismarck	20	4	1	2	1	3	1	3	0
Ohio:	Cincinnati	0				0				
	Columbus	4	2	0	0	0				
	Painesville	18	0	0	0	9	95	9	95	21
Okla:	Oklahoma City	12	6	0	1	0				
	Ponca City	0				0				
Oreg:	Portland	21	0	9	0	16	115	16	115	3
Pa:	Harrisburg	16	1	0	0	4	101	4	101	16
P.R:	San Juan	0				0				
R.I:	Providence	20	0	0	0	0				
S.C:	Columbia	9	2	0	0	4	131	4	131	1
S. Dak:	Pierre	19	5	1	2	0				
Tenn:	Nashville	18	1	0	0	7	142	7	142	1
Tex:	Austin	21	6	1	2	7	63	[b]		
	El Paso	17	3	0	2	0				
Utah:	Salt Lake City	27	1	0	1	5	27	5	27	15
Vt:	Barre	18	1	0	0	8	127	8	127	5
Va:	Richmond	19	0	0	0	8	433	8	433	*75
Wash:	Seattle	8	0	0	0	6	71	[b]		
	Spokane	15	2	0	1	0				
W. Va:	Charleston	19	1	0	0	13	121	13	121	13
Wisc:	Madison	20	1	0	0	4	30	4	30	1
Wyo:	Cheyenne	12	2	0	1	1	4	1	4	0
Network summary		1,008	10	0	1	214	112	6	100	6

[a] The monthly average is calculated by weighting the field estimates of individual air samples with length of sampling period.
[b] This station is part of the tritium surveillance system. No gross beta measurements are done.
* This datum is suspect due to operational procedures.

2. Canadian Air and Precipitation Monitoring Program,[1] November 1972

Radiation Protection Division, Department of National Health and Welfare

The Radiation Protection Division of the Canadian Department of National Health and Welfare monitors surface air and precipitation in connection with its Radioactive Fallout Study Program. Twenty-four collection stations are located at airports (figure 2), where the sampling equipment is operated by personnel from the Meteorological Services Branch of the Department of Transport. Detailed discussions of the sampling procedures, methods of analysis, and interpretation of results of the radioactive fallout program are contained in reports of the Department of National Health and Welfare (*1–5*).

A summary of the sampling procedures and methods of analysis was presented in the May 1969 issue of *Radiological Health Data and Reports.*

[1] Prepared from information and data obtained from the Canadian Department of National Health and Welfare, Ottawa, Canada.

Surface air and precipitation data for November 1972 are presented in table 2.

Table 2. Canadian gross beta radioactivity in surface air and precipitation, November 1972

Station	Number of samples	Air surveillance gross beta radioactivity (pCi/m³)			Precipitation measurements	
		Maximum	Minimum	Average	Average concentration (pCi/liter)	Total deposition (nCi/m²)
Calgary	4	0.0	0.0	0.0	59	0.3
Coral Harbour	4	.0	.0	.0	54	.7
Edmonton	4	.0	.0	.0	20	.6
Ft. Churchill	4	.0	.0	.0	28	.3
Fredericton	4	.0	.0	.0	8	1.0
Goose Bay	4	.0	.0	.0	5	.4
Halifax	4	.0	.0	.0	4	.9
Inuvik	4	.0	.0	.0	11	.2
Montreal	4	.0	.0	.0	5	.5
Moosonee	4	.0	.0	.0	14	.4
Ottawa	4	.0	.0	.0	7	.5
Quebec	4	.0	.0	.0	NS	NS
Regina	4	.1	.0	.0	27	.3
Resolute	4	.0	.0	.0	40	.2
St. John's, Nfld.	4	.0	.0	.0	3	.7
Saskatoon	4	.0	.0	.0	35	.3
Sault Ste. Marie	4	.0	.0	.0	20	1.3
Thunder Bay	4	.0	.0	.0	21	.7
Toronto	4	.0	.0	.0	5	.4
Vancouver	4	.0	.0	.0	11	1.2
Whitehorse	4	.0	.0	.0	49	.2
Windsor	0	NS	NS	NS	11	.1
Winnipeg	4	.0	.0	.0	35	.4
Yellowknife	4	.1	.0	.0	15	.3
Network summary	92	0.1	0.0	0.0	21	0.5

NS, no sample.

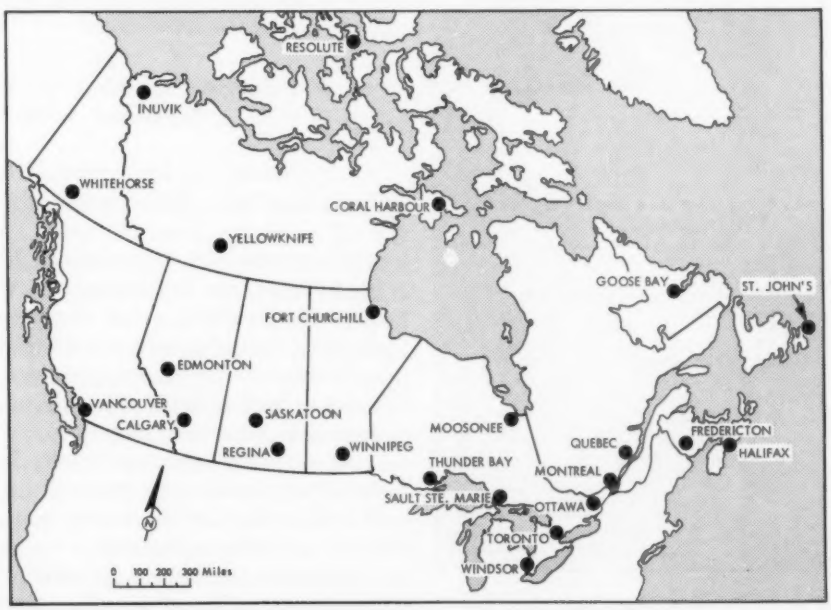

Figure 2. Canadian air and precipitation monitoring program

3. Pan American Air Sampling Program November 1972

Pan American Health Organization and U.S. Environmental Protection Agency

Gross beta radioactivity in air is monitored by countries in the Americas under the auspices of the collaborative program developed by the Pan American Health Organization (PAHO) and the Environmental Protection Agency (EPA) to assist PAHO-member countries in developing radiological health programs.

The air sampling station locations are shown in figure 3. Analytical techniques were described in the March 1968 issue of *Radiological Health Data and Reports*. The November 1972 air monitoring results from the participating countries are given in table 3.

Table 3. Summary of gross beta radioactivity in Pan American surface air, November 1972

Station location		Number of samples	Gross beta radioactivity (pCi/m³)		
			Maximum	Minimum	Average [a]
Argentina:	Buenos Aires	0			
Bolivia:	La Paz	13	0.07	0.00	0.02
Chile:	Santiago	23	.05	.00	.03
Colombia:	Bogota	21	.01	.00	.00
Ecuador:	Cuenca	0			
	Guayaquil	18	.04	.00	.02
	Quito	5	.00	.00	.00
Guyana:	Georgetown	4	.00	.00	.00
Jamaica:	Kingston	0			
Peru:	Lima	0			
Venezuela:	Caracas	7	.00	.00	.00
West Indies:	Trinidad	20	.07	.00	.02
Pan American summary		111	0.07	0.00	0.02

[a] The monthly average is calculated by weighting the individual samples with length of sampling period. Values less than 0.005 pCi/m³ are reported and used in averaging as 0.00 pCi/m³.

Figure 3. Pan American Air Sampling Program stations

4. California Air Sampling Program November 1972

Bureau of Radiological Health
California State Department of Public Health

The Bureau of Radiological Health of the California State Department of Public Health with the assistance of several cooperating agencies and organizations operates a surveillance system for determining radioactivity in airborne particulates. The air sampling locations are shown in figure 4.

All air samples are sent to the Sanitation and Radiation Laboratory of the State Department of Public Health where they are analyzed for their radioactive content.

Airborne particles are collected by a continuous sampling of air filtered through a 47

Figure 4. California air sampling program stations

millimeter membrane filter, 0.8 micron pore size, using a Gast air pump of about 2 cubic feet per minute capacity, or 81.5 cubic meters per day. Air volumes are measured with a direct reading gas meter. Filters are replaced every 24 hours except on holidays and weekends. The filters are analyzed for gross alpha and beta radioactivity, 72 hours after the end of the collection period. The daily samples are then composited into a monthly sample for gamma spectroscopy and an analysis for strontium-89 and strontium-90. Table 4 presents the monthly gross beta radioactivity in air for November 1972. The monthly sample results are presented quarterly.

Table 4. Gross beta radioactivity in California air November 1972

Station location	Number of samples	Gross beta radioactivity (pCi/m³)		
		Maximum	Minimum	Average
Bakersfield	24	0.36	0.02	0.11
Barstow	29	1.04	.02	.24
Berkeley	29	.17	.00	.05
Colfax	22	.34	.00	.11
El Centro	30	.87	.01	.23
Eureka	29	.12	.00	.03
Fresno	29	1.15	.00	.14
Los Angeles	29	.15	.00	.07
Redding	30	.28	.00	.05
Sacramento	30	.71	.00	.09
Salinas	30	2.52	.00	.29
San Bernardino	27	.39	.00	.11
San Diego	30	.45	.03	.10
Santa Rosa	30	.12	.00	.05
Summary	398	2.52	0.00	0.12

5. Plutonium in Airborne Particulates July–September 1972

Office of Radiation Programs
Environmental Protection Agency

The Radiation Alert Network (RAN) of the Division of Atmospheric Surveillance, Environmental Protection Agency, routinely collects airborne particulate samples from 11 selected RAN stations for plutonium analyses. The plutonium analyses were initiated in November 1965, and references to the previous results through December 1969 have been published (*6*).

One-half of each individual air filter from the selected stations is sent to the Eastern Environmental Radiation Facility, Montgomery, Ala. The laboratory analyzes a composite of these samples from each station on a quarterly basis. The results from July–September 1972 are presented in table 5. The minimum detectable activities are 0.020 pCi and 0.015 pCi per sample for plutonium-238 and plutonium-239, respectively. The volume of air samples varies, generally ranging from 20,000 to 30,000 cubic meters per month.

Table 5. Plutonium in airborne particulates July–September 1972

Location		Plutonium-238 (aCi/m³)	Plutonium-239 (aCi/m³)	Plutonium-239/ plutonium-238
Alaska:	Anchorage	0.4±0.2	13.9±3.5	35±19
Ariz:	Phoenix	2.0± .4	31.2±2.8	16± 3
Colo:	Denver	1.9± .4	16.5±1.5	9± 2
Hawaii:	Honolulu	1.9± .5	19.5±2.0	10± 3
La:	New Orleans	3.0± .5	25.2±2.3	8± 2
Md:	Baltimore	1.8± .4	30.7±2.7	17± 4
N.Y:	Buffalo	1.5± .3	40.7±3.3	27± 6
N.C:	Gastonia	3.7± .8	22.7±2.5	6± 2
S. Dak:	Pierre	3.3± .6	38.1±3.4	12± 2
Tex:	Austin	2.0± .4	42.2±3.4	21± 5
Wash:	Seattle	.5± .2	19.7±2.0	39±16

Other coverage in *Radiation Data and Reports:*

Period	Issue
July–September 1971	April 1972
Octboer–December 1971	July 1972
January–March 1972	December 1972
April–June 1972	January 1973

REFERENCES

(*1*) BIRD, P. M., A. H. BOOTH, and P. G. MAR. Annual report of 1959 on the Radioactive Fallout Study Program, CNHW-RP-3. Department of National Health and Welfare, Ottawa, Canada (May 1960).

(*2*) BIRD, P. M., A. H. BOOTH, and P. G. MAR. Annual report for 1960 on the Radioactive Fallout Study Program, CNHW-RP-3. Department of National Health and Welfare, Ottawa, Canada (December 1961).

(*3*) MAR, P. G. Annual report for 1961 on the Radioactive Fallout Study Program, CNHW-RP-5. Department of National Health and Welfare, Ottawa, Canada (December 1962).

(*4*) BEALE, J. and J. GORDON. The operation of the Radiation Protection Division Air Monitoring Program, RPD-11. Department of National Health and Welfare, Ottawa, Canada (July 1962).

(*5*) BOOTH, A. H. The calculation of permissible levels of fallout in air and water and their use in assessing the significance of 1961 levels in Canada, RPD-21. Department of National Health and Welfare, Ottawa, Canada (August 1962).

(*6*) BUREAU OF RADIOLOGICAL HEALTH. Plutonium in airborne particulates, April–December 1969. Radiol Health Data Rep 11:552–553 (October 1970).

Air Surveillance Network, November 1972

National Environmental Research Center—
Las Vegas,[1] Environmental Protection Agency

The Air Surveillance Network (ASN), operated by the National Environmental Research Center—Las Vegas (NERC-LV), consists of 104 active and 18 standby sampling stations located in 21 western States (figures 1 and 2). The network is operated in support of nuclear testing sponsored by the Atomic Energy Commission (AEC) at the Nevada Test Site (NTS), by the Space Nuclear Systems Office at the Nuclear Rocket Development Station (which lies within the NTS), and by the AEC at any other designated testing sites.[2]

[1] Formerly the Western Environmenal Research Laboratory.

[2] The ASN is operated under a Memorandum of Understanding (No. AT(26-1)-539) with the Nevada Operations Office, U.S. Atomic Energy Commission.

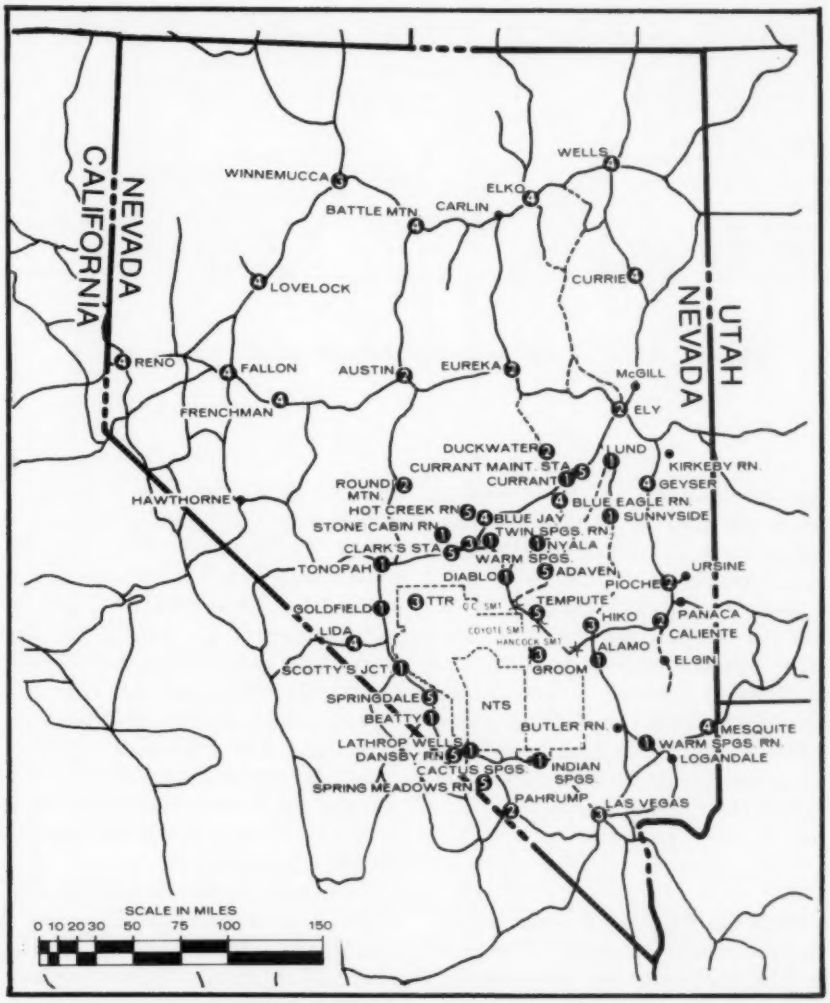

Figure 1. NERC-LV Air Surveillance Network stations in Nevada

Figure 2. NERC-LV Air Surveillance Network stations outside Nevada

The stations are operated by State health department personnel and by private individuals on a contract basis. All active stations are operated continuously with filters being exchanged over periods generally ranging from 24 to 72 hours. All samples are mailed to the NERC-LV unless special retrieval is arranged at selected locations in response to known releases of radioactivity from the NTS. A complete description of sampling and analytical procedures was presented in the February 1972 issue of *Radiation Data and Reports.*

Results

Table 1 presents the monthly average gross beta concentrations in air for each of the network stations. The highest gross beta concentration within the network was less than 0.4 pCi/m³ at Denver, Colo., based on a small volume of 81 m³. The highest concentration based on normal sample volume was 0.2 pCi/m³ at Worland, and Rock Springs, Wyo., and Duckwater, Nev. The minimum reported concentration for gross beta is 0.1 pCi/m³. For averaging purposes, individual concentrations which are below the minimum detectable concentration (0.06 pCi/m³) are assumed to be equal to the minimum detectable concentration. Averages less than the minimum reporting level are reported as less than 0.1 pCi/m³. No radionuclides were identified by gamma spectrometry on any filters or charcoal cartridges during November.

Complete copies of this summary and listings of the daily gross beta and gamma spectrometry results are distributed to EPA regional offices and appropriate State agencies. Additional copies of the daily results may be obtained from the NERC-LV upon written request.

Table 1. Summary of gross beta radioactivity concentrations in air, November 1972

Location		Number of samples	Concentration (pCi/m³)		
			Maximum	Minimum	Average [a]
Ariz:	Kingman	30	0.1	<0.1	0.1
	Phoenix	28	.1	<.1	.1
	Seligman	29	<.1	<.1	.1
	Winslow	30	<.1	<.1	.1
Ark:	Little Rock	16	<.1	<.1	.1
Calif:	Baker	29	.1	<.1	.1
	Barstow	29	<.1	<.1	.1
	Bishop	30	<.2	<.1	.1
	Death Valley Junction	30	<.2	<.1	.1
	Furnace Creek	30	.1	<.1	.1
	Indio	30	<.1	<.1	.1
	Lone Pine	29	<.1	<.1	.1
	Needles	28	<.1	<.1	.1
	Ridgecrest	30	.1	<.1	.1
	Shoshone	30	<.1	<.1	.1
Colo:	Denver	21	<.4	<.1	.1
	Durango	20	<.1	<.1	.1
Idaho:	Boise	29	<.1	<.1	.1
	Idaho Falls	20	.1	<.1	.1
	Preston	31	<.3	<.1	.1
	Twin Falls	29	<.1	<.1	.1
Iowa:	Iowa City	17	<.1	<.1	.1
	Sioux City	24	.1	<.1	.1
Kans:	Dodge City	30	<.1	<.1	.1
La:	Lake Charles	20	.1	<.1	.1
	Monroe	19	<.1	<.1	.1
	New Orleans	17	.1	<.1	.1
Minn:	Minneapolis	21	.1	<.1	.1
Mo:	Joplin	30	<.1	<.1	.1
	St. Joseph	30	<.1	<.1	.1
	St. Louis	30	<.1	<.1	.1
Nebr:	North Platte	27	<.3	<.1	.1
Nev:	Alamo	30	.1	<.1	.1
	Austin	23	<.1	<.1	.1
	Battle Mountain	29	<.1	<.1	.1
	Beatty	30	<.1	<.1	.1
	Blue Eagle Ranch (Currant)	28	<.2	<.1	.1
	Blue Jay	30	.1	<.1	.1
	Caliente	30	.1	<.1	.1
	Currant Ranch	29	<.1	<.1	.1
	Currie	30	<.1	<.1	.1
	Diablo	30	<.1	<.1	.1
	Duckwater	24	.2	<.1	.1
	Elko	30	<.1	<.1	.1
	Ely	29	<.1	<.1	.1
	Eureka	30	<.1	<.1	.1
	Fallini's Twin Springs Ranch	30	<.1	<.1	.1
	Fallon	30	<.1	<.1	.1
	Frenchman Station	30	.1	<.1	.1
	Geyser Maintenance Station	29	<.1	<.1	.1
	Goldfield	23	<.1	<.1	.1
	Groom Lake	23	<.1	<.1	.1
	Hiko	30	.1	<.1	.1
	Indian Springs	30	<.1	<.1	.1
	Las Vegas	21	.1	<.1	.1
	Lathrop Wells	30	.1	<.1	.1
	Lida	30	<.1	<.1	.1
	Lovelock	30	.1	<.1	.1
	Lund	28	<.1	<.1	.1
	Mesquite	30	.1	<.1	.1
	Nyala	27	<.1	<.1	.1
	Pahrump	22	<.1	<.1	.1
	Ploche	30	<.1	<.1	.1
	Reno	30	<.1	<.1	.1
	Round Mountain	29	<.1	<.1	.1
	Scotty's Junction	29	<.1	<.1	.1
	Stone Cabin Ranch	30	<.1	<.1	.1
	Sunnyside	27	<.1	<.1	.1
	Tonopah	30	<.1	<.1	.1
	Tonopah Test Range	27	<.1	<.1	.1
	Warm Springs	30	<.1	<.1	.1
	Warm Springs Ranch	30	.1	<.1	.1
	Wells	30	.1	<.1	.1
	Winnemucca	31	<.3	<.1	.1
N. Mex:	Albuquerque	22	<.3	<.1	.1
	Carlsbad	24	.1	<.1	.1
Okla:	Muskogee	29	<.1	<.1	.1
Oreg:	Burns	26	<.1	<.1	.1
	Medford	28	<.1	<.1	.1
S. Dak:	Aberdeen	30	<.1	<.1	.1
	Rapid City	28	<.1	<.1	.1
Tex:	Abilene	14	.1	<.1	.1
	Amarillo	30	.1	<.1	.1
	Austin	18	.1	<.1	.1
	Fort Worth	28	<.1	<.1	.1
Utah:	Bryce Canyon	19	<.1	<.1	.1
	Cedar City	28	<.1	<.1	.1
	Delta	30	<.1	<.1	.1

See footnote at end of table.

Table 1. Summary of gross beta radioactivity concentrations in air, November 1972—continued

Location		Number of samples	Concentration (pCi/m³)		
			Maximum	Minimum	Average [a]
Utah:	Dugway	30	<.1	<.1	.1
	Enterprise	30	<.1	<.1	.1
	Garrison	30	<.1	<.1	.1
	Logan	30	.1	<.1	.1
	Milford	30	<.1	<.1	.1
	Monticello	30	<.1	<.1	.1
	Parowan	28	<.1	<.1	.1
	Provo	29	<.1	<.1	.1
	Roosevelt	30	.1	<.1	.1
	Salt Lake City	30	<.1	<.1	.1
	St. George	30	.1	<.1	.1
	Wendover	30	<.1	<.1	.1
Wash:	Seattle	21	<.1	<.1	.1
	Spokane	14	.1	<.1	.1
Wyo:	Rock Springs	30	.2	<.1	.1
	Worland	30	.2	<.1	.1

[a] Individual values less than the minimum detectable concentration (MDC) are set equal to the MDC for averaging. A monthly average less than the minimum reportable value of 0.1 pCi/m³ is reported as <0.1.

SECTION IV. OTHER DATA

This section presents results from routine sampling of biological materials and other media not reported in the previous sections. Included here are such data as those obtained from human bone sampling, Alaskan surveillance, and environmental monitoring around nuclear facilities.

Environmental Levels of Radioactivity at Atomic Energy Commission Installations

The U.S. Atomic Energy Commission (AEC) receives from its contractors semiannual reports on the environmental levels of radioactivity in the vicinity of major Commission installations. The reports include data from routine monitoring programs where operations are of such a nature that plant environmental surveys are required.

Releases of radioactive materials from AEC installations are governed by radiation standards set forth by AEC's Division of Operational Safety in directives published in the "AEC Manual."[1]

A summary of the environmental radioactivity data follow for Bettis Atomic Power Laboratory and the Mound Laboratory.

[1] Title 10, Code to Federal Regulations, Part 20, "Standards for Protection Against Radiation" contains essentially the standards published in Chapter 0524 of the AEC Manual.

Bettis Atomic Power Laboratory [2] January–December 1971

Westinghouse Electric Corporation
Pittsburgh, Pa.

The Bettis Atomic Power Laboratory is operated by the Westinghouse Electric Corporation for the U.S. Atomic Energy Commission and is situated on a 200-acre tract of land in the Borough of West Mifflin, Pa., approximately 7 miles southeast of the city of Pittsburgh. The Facility consists of a main laboratory area and a critical facility area and is engaged in the design and development of nuclear power reactors in support of the naval reactors program of the Atomic Energy Commission. A map of the Bettis Laboratory and surrounding area is provided in figure 1.

This document summarizes the disposal of radioactive liquid, airborne, and solid waste products which originate from the design and development activities conducted at the laboratory for January–December 1971. Solid radioactive waste materials are shipped offsite in approved sealed containers for land burial and have no effect on the environs surrounding the laboratory. Radioactive liquid and airborne effluents are treated prior to being released and all such discharges to the environment are limited to the lowest amount practical. Upper limits on discharges are based on the values recommended in 10CFR20, AEC Manual, Chapter 0524, and Pennsylvania Rules and Regulations Article 433.

An environmental monitoring program has been maintained at the laboratory since 1959 and provides a means of monitoring the stringent control of radioactive discharges from the facility. The program also ensures compliance with the applicable State and federal radioactivity standards and ascertains that the health and safety of the general public is protected.

[2] Summarized from "Bettis Atomic Power Laboratory, Effluent and Environmental Monitoring Report, Calendar Year 1971" (WAPD-RS(EA)-31).

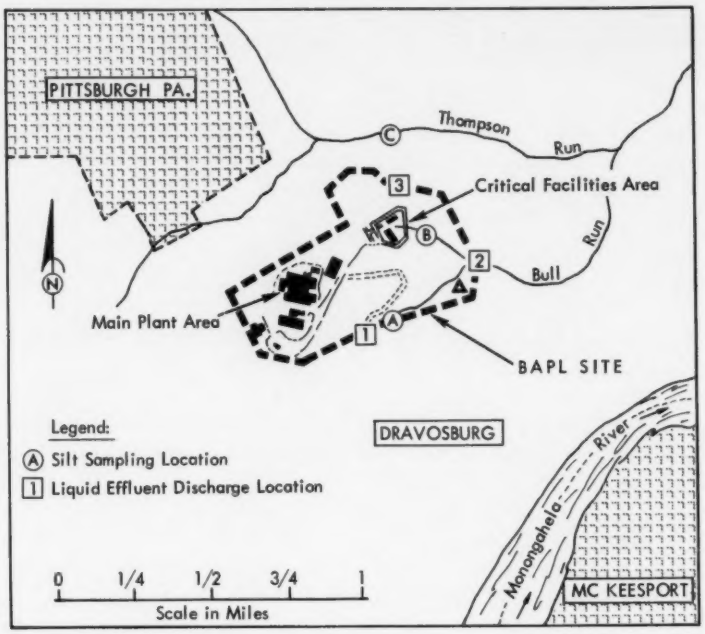

Figure 1. Bettis Atomic Power Laboratory sampling stations

Liquid radioactive waste

Laboratory radioactive liquids are collected in retention tanks and are treated by either filtration, ion exchange, or evaporation until the activity levels obtained are as low as practical. All liquid effluents released to the environment are sampled and stringently controlled to ensure that the quantity of activity is small and that the activity concentrations are well below the laboratory discharge limit. Laboratory liquid effluents are released at the locations shown in figure 1. All three of the liquid effluent discharge sources are small brooks which neither support aquatic life nor are utilized for irrigation or drinking purposes. The radioactive constituents contained in the liquid effluent which are attributable to laboratory operations are strontium-90 and cesium-137 but these are present in very low concentrations. The net quantity of radioactivity released to the environment attributable to laboratory operations during 1971 was only 0.011 curie or 5.1 percent of the applicable laboratory discharge limit which is based on the maximum permissible concentration of strontium-90 in water as specified in 10CFR 20.

Airborne radioactivity monitoring

All radioactive laboratory exhaust air is filtered prior to being released to the environment through continuously monitored stacks. For 1971, less than 0.11 curie of particulate radioactivity was released from the laboratory exhaust stacks. This is equivalent to less than 10 percent of the concentration guide for an unknown mixture of radionuclides in air at the site boundary. Monitoring confirmed that at no time during 1971 did the exhaust air discharges from any of the stacks exceed one tenth of the AEC concentration guides for air and in fact the activity in many stacks was less than the minimum detectable level. No observable effect in excess of background radiation was detected on the perimeter film badges and the general

public was not exposed to radiation exposure above background as a result of laboratory operations.

Stream silt

Stream silt samples are periodically collected downstream from the three laboratory discharge locations and also from a control stream in which laboratory liquid effluents are not discharged. A 2-year comparison of the laboratory average net silt radioactivity with the natural radioactivity detected in the Streets Run control stream silt samples is shown in table 1. The table shows that there is a wide fluctuation in the natural radioactivity levels in the Streets Run control stream and that the radioactivity levels detected in the 3 laboratory brooks are low and decreasing.

Table 1. Radioactivity in stream silt Bettis Laboratory, 1970–1971

Year	Detected silt radioactivity attributable to laboratory operations (pCi/g)		Detected silt radioactivity in the Streets Run control stream (pCi/g)	
	Alpha	Beta-gamma	Alpha	Beta-gamma
1970	4.0	29.0	3.5	23.0
1971	3.8	19.9	.9	5.4

Monongahela River water

The brooks into which laboratory effluent is discharged eventually empty into the Monongahela River. Downstream measurements of radioactivity in Monongahela River water for June 1971 are reported in reference (*1*) for 2 locations. Similar measurements (*1*) were also obtained from the Beaver River, which is also a tributary of the Ohio River. There are no nuclear facilities located along the Beaver River watershed. A comparison of these data show that the measured radioactivity in the Monongahela River water is equal to or less than the levels measured in the Beaver River. Similar conclusions for March 1971 are drawn from data in reference (*2*). It is concluded from these data that Bettis operations had no effect on the radioactivity levels in the Monongahela River water.

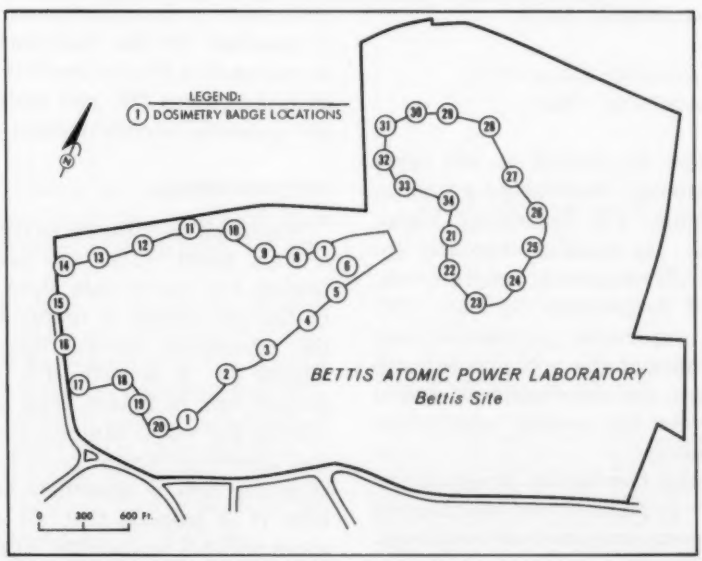

Figure 2. Dosimetry badge locations, BAPL

Stream vegetation

Vegetation samples were collected from the 3 laboratory brooks and also from the Streets Run control stream. The radioactivity measurements obtained from the vegetation samples showed no significant difference from the level obtained from the control stream vegetation samples. It is concluded therefore that the operation of the laboratory has had no significant environmental effect on the plant and wildlife in the vicinity of the laboratory.

Perimeter monitoring

Environmental monitoring film badges were placed at 34 locations on the perimeter fence of the laboratory as shown in figure 2 and compared with the radiation levels measured on 9 nearby control badges. No difference in radiation levels was observed between that at the Bettis perimeter and natural background. From this comparison, it is concluded that the general public did not receive radiation exposure greater than natural background as a result of Bettis operations. Stringent control of Bettis operations has resulted in low levels of radioactivity in the laboratory liquid and airborne effluents; measurements of Monongahela River water show no detectable radioactivity caused by Bettis operations and the Bettis operations have caused no exposure to members of the general public above natural background levels.

Recent coverage in *Radiological Health Data and Reports:*

Period	Issue
January–December 1971	November 1971

REFERENCES

(*1*) ENVIRONMENTAL PROTECTION AGENCY. Gross radioactivity in surface waters of the United States June 1971. Rad Health Data Rep 13:81 (February 1972).
(*2*) ENVIRONMENTAL PROTECTION AGENCY. Gross radioactivity in surface waters of the United States, March 1971. Rad Health Data Rep 12:572–573 (November 1971).

2. Mound Laboratory[3] July–December 1970

Monsanto Research Corporation
Miamisburg, Ohio

Mound Laboratory is situated on 180 acres of land in Miamisburg, Ohio, about 12 miles southwest of Dayton. The laboratory began operation in 1949. Its mission currently includes research, development, engineering, and production of components for the AEC weapons program; separation, purification, and sale of stable isotopes of the noble gases; and development, design, and fabrication of radioisotopic heat sources for medical application and space exploration.

The environmental monitoring program for Mound Laboratory is planned and coordinated with all of the projects conducted at the laboratory. Air and water monitoring in the uncontrolled environs surrounding the laboratory is specified for the radionuclides which could be released to the environment. Only polonium-210, plutonium-238, and hydrogen-3 (tritium) are potential environmental contaminants.

Air monitoring

Mobile air monitoring equipment, mounted on a 1-ton panel truck, was used for measuring tritium and particulate alpha-particle emitters in the air within a radius of 20 miles from the laboratory during the collection period (figure 3). In August 1970, the sampling frequency was increased from once per week to 3 times per week. Samples are collected upwind and downwind from the laboratory. Since the sampling zone is dependent on the wind direction, it is possible that air samples from all zones will not be collected during the reporting period.

Airborne polonium and plutonium particulates are collected on Whatman No. 41 filter

[3] Summarized from "Environmental Monitoring Report," July-December 1970 and 1970 Summary (MLM 1795).

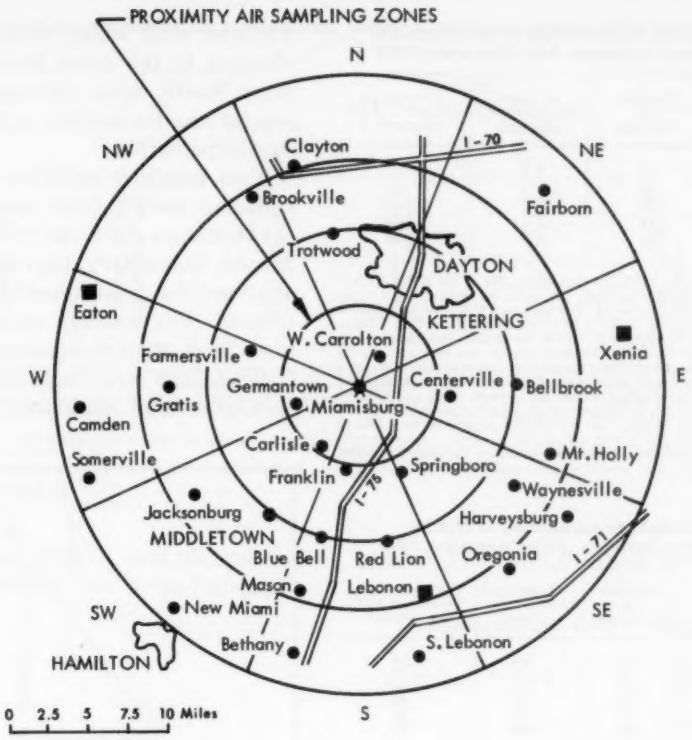

Figure 3. Offsite air sampling zones, Mound Laboratory

paper with a high-volume air sampler. A 5-cm diameter circle, cut from the center of each filter paper, is processed and analyzed for plutonium-238.

Airborne tritium oxide is monitored by bubbling air through 100-ml of a liquid scintillation counting solution with p-dioxane as the organic solvent. A 20-ml aliquot of the resulting solution is counted directly in a liquid scintillation spectrometer for 10 minutes. The analysis is directed to tritium oxide rather than the gas because the AEC standard for the oxide is 200 times more restrictive than for the gas.

The results of the airborne monitoring program are presented in tables 2, 3, and 4. The average concentrations of polonium-210, plu-

Table 2. Atmospheric monitoring of polonium-210 Mound Laboratory environs, July–December 1970

Range (miles)	Number of samples	Average concentration [a] (fCi/m³)	Average as percent of AEC standards [b]
0– 3 (upwind)	59	15	0.08
0– 3 (downwind)	59	8	.04
3– 5 (downwind)	58	10	.05
5–10 (downwind)	59	9	.05
10–15 (downwind)	59	11	.06
15–20 (downwind)	59	6	.03

[a] Lowest detectable level (LDL) for polonium-210 in air is 8 fCi/m³ for samples collected 0–3 miles upwind, 3–5 miles downwind, 5–10 miles downwind, and 10–15 miles downwind. The LDL is 5 fCi/m³ for samples collected 0–3 miles downwind and 15–20 miles downwind. Two LDL's are expressed above for the ranges in which polonium-210 samples are collected. Air is sampled at three locations within the 0–3 and 15–20 mile downwind ranges, and the filter papers are combined to form one composite sample for each range. Air samples in other ranges are comprised of samples collected at two locations within each range. Since the volume of air analyzed in the 0–3 and 15–20 mile downwind ranges is 33 percent greater than in the other ranges, the sensitivity expressed as LDL is proportionately lower.

[b] The applicable AEC radiation protection standard for polonium-210 in air is 20 pCi/m³.

Table 3. Atmospheric monitoring of plutonium-238 Mound Laboratory environs, July–December 1970

Range (miles)	Number of samples	Average concentration [a] (fCi/m³)	Average as percent of AEC standards [b]
0– 3 (upwind)	57	2.8	0.28
0– 3 (downwind)	57	1.5	.15
3– 5 (downwind)	57	1.9	.19
5–10 (downwind)	57	2.1	.21
10–15 (downwind)	57	2.2	.22
15–20 (downwind)	57	1.9	.19

[a] Lowest detectable level (LDL) for plutonium-238 in air is 1.3 fCi/m³ for samples collected 0–3 miles upwind, 3–5 miles downwind, 5–10 miles downwind, and 10–15 miles downwind. The LDL is 0.9 fCi/m³ for samples collected 0–3 miles downwind and 15–20 miles downwind. Two LDL's are expressed above for the ranges in which plutonium-238 samples are collected. Air is sampled at three locations within the 0–3 and 15–20 mile downwind ranges, and the filter papers are combined to form one composite sample for each range. Air samples in other ranges are comprised of samples collected at two locations within each range. Since the volume of air analyzed in the 0–3 and 15–20 mile downwind ranges is 33 percent greater than in the other ranges, the sensitivity expressed as LDL is proportionately lower.

[b] The applicable AEC radiation protection standard for plutonium-238 in air is 1 pCi/m³.

Table 4. Atmospheric monitoring of tritium Mound Laboratory environs, July–December 1970

Range (miles)	Number of samples	Average concentration [a] (pCi/m³)	Average as percent of AEC standards [b]
0– 3 (upwind)	57	530	0.26
0– 3 (downwind)	58	3,400	1.70
3– 5 (downwind)	58	730	.36
5–10 (downwind)	59	500	.25
10–15 (downwind)	59	640	.32
15–20 (downwind)	59	540	.27

[a] Lowest detectable limit for tritium in air is 200 pCi/m³.

[b] The applicable AEC radiation protection standard for tritium in air is 200 nCi/m³.

tonium-238, and tritium in the environment are below the AEC radiation protection standards.

Water monitoring

Liquid radioactive waste materials from polonium and plutonium operations at the laboratory are processed separately to reduce the concentrations of these radionuclides to a level at which they may be discharged to the environment. Treated polonium liquid waste is discharged to the Great Miami River via a closed sewer line which also carries the treated plant sewage. The treated plutonium waste is discharged to a drainage ditch which runs through the plant site and eventually reaches the river.

Helium-3 being purified at the Mound Laboratory contains small quantities of tritium. In addition, tritium is recovered from various AEC tritium-contaminated wastes. Liquid waste generated by these operations is treated (diluted with water when necessary) and discharged to the same drainage ditch as plutonium waste. Some tritium-contaminated liquid wastes are discharged to the same closed sewer line as polonium.

Two hundred milliliter water samples are collected weekly from the Great Miami River, the drainage ditch and two ponds northeast of Mound Laboratory (figure 4). All samples are analyzed for polonium-210, plutonium-238, and tritium. The average concentrations of plutonium and tritium in water discharged to the environment were well below the AEC radiation protection standards. Average concentra-

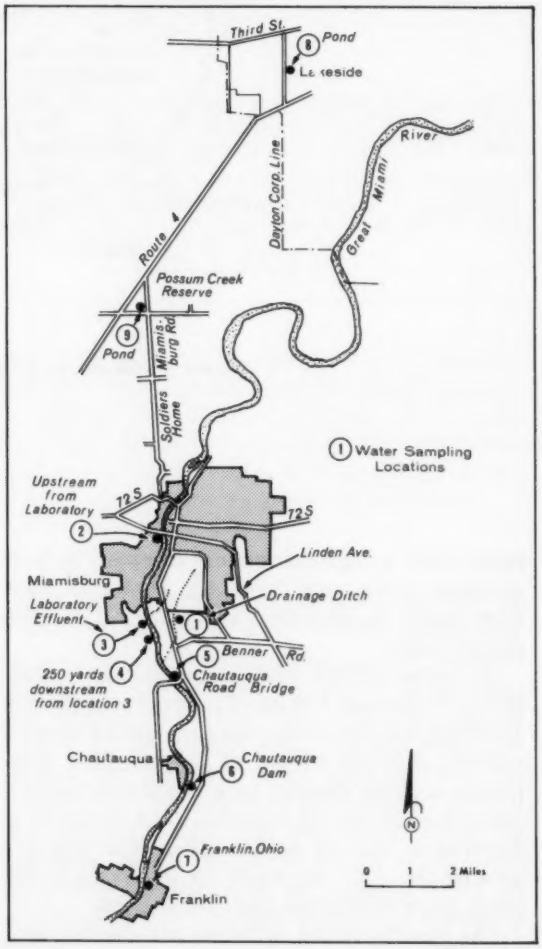

Figure 4. Offsite water sampling locations Mound Laboratory

Table 5. Offsite water monitoring for radioactivity, Mound Laboratory environs, July–December 1970

Sampling location [a]	Number of samples [b]	Polonium-210 [c] (pCi/liter)		Plutonium-238 [c] (pCi/liter)		Tritium [c] (hydrogen-3) (nCi/liter)	
		Average [d]	Percent of concentration limit	Average [d]	Percent of concentration limit	Average [d]	Percent of concentration limit
1	38	2.01	0.29	34.4	0.69	352	11.73
2	38	2.51	.36	5.2	.10	11.0	.37
3	38	51.9	7.41	9.2	.18	177	5.90
4	38	2.25	.32	5.4	.11	10.0	.33
5	38	1.85	.26	5.3	.11	9.0	.30
6	38	2.18	.31	6.4	.13	9.0	.30
7	38	1.94	.28	4.6	.09	15.0	.50
8	38	2.54	.36	5.1	.10	11.0	.37
9	38	1.92	.27	5.7	.11	11.0	.37

[a] See figure 4 for number of sampling locations.
Sampling location and description: 1 ,Mound Laboratory drainage ditch; 2, Linden Avenue bridge, upstream from laboratory; 3, Mound Laboratory effluent; 4, 250 yards downstream from location 3; 5, Chautauqua Road Bridge; 6, Chautauqua Dam; 7, Franklin, Ohio; 8, Pond, opposite V.A. hospital, Dayton, Ohio, 8 miles NE of Mound Laboratory; 9, Pond, Possum Creek Reserve, Dayton, Ohio, 6 miles NE of Mound Laboratory.
[b] In August 1970 the sampling frequency was increased from once per week to twice per week. The number of samples for plutonium-238 ranged from 36 to 38.
[c] Lowest detectable level for polonium-210 in water is 1.80 pCi/liter. Lowest detectable level for plutonium-238 in water is 4.5 pCi/liter. Lowest detectable level for tritium in water is 6 nCi/liter.
[d] The applicable AEC radiation protection standard for uncontrolled areas are as follows: polonium-210 in water, 700 pCi/liter; plutonium-238 in water, 5 nCi/liter; tritium in water, 3 μCi/liter.

tions of tritium, polonium-210, and plutonium-238 are given in table 5 for July–December 1970.

Recent coverage in *Radiation Data and Reports:*

Period	Issue
January–June 1970	January 1973

Nuclear Power Reactors in the United States
December 31, 1972

Each quarter year, the Atomic Energy Commission releases information on the status of all present and proposed civilian nuclear power generating units in the United States. This information is reproduced for interested readers of *Radiation Data and Reports.*

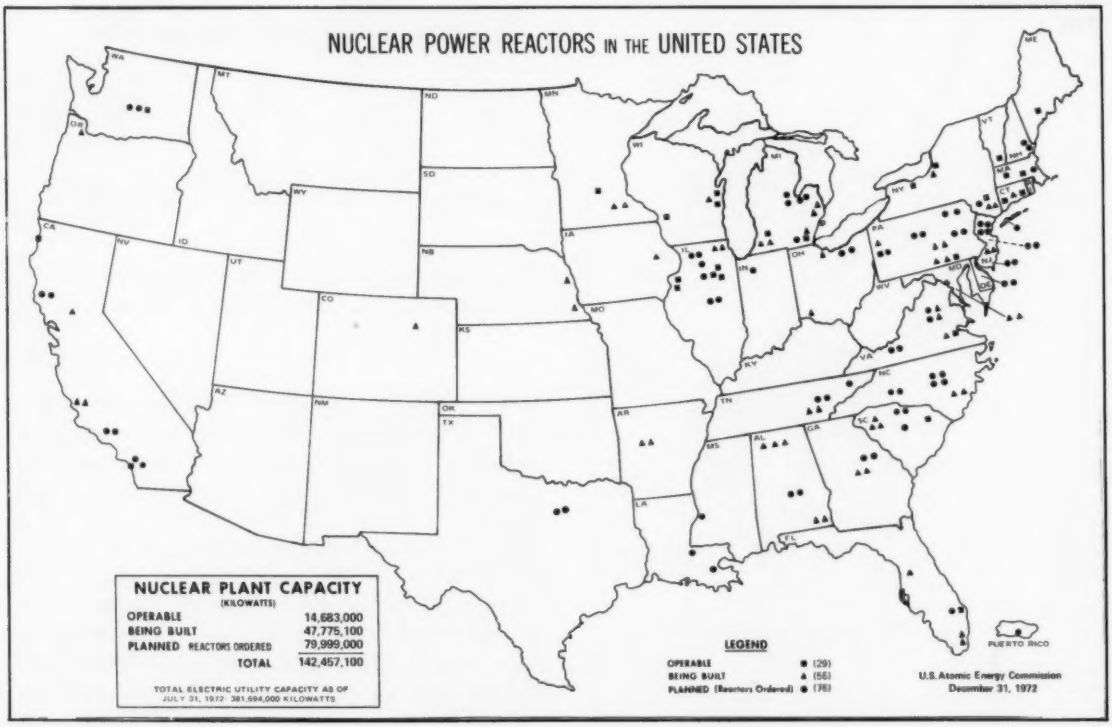

Figure 1. Nuclear power reactors in the United States, December 31, 1972

SITE	PLANT NAME	CAPACITY (Net Kilowatts)	UTILITY	INITIAL DESIGN POWER
ALABAMA				
Decatur	Browns Ferry Nuclear Power Plant: Unit 1	1,065,000	Tennessee Valley Authority	1973
Decatur	Browns Ferry Nuclear Power Plant: Unit 2	1,065,000	Tennessee Valley Authority	1974
Decatur	Browns Ferry Nuclear Power Plant: Unit 3	1,065,000	Tennessee Valley Authority	1974
Dothan	Joseph M. Farley Nuclear Plant: Unit 1	829,000	Alabama Power Co.	1975
Dothan	Joseph M. Farley Nuclear Plant: Unit 2	829,000	Alabama Power Co.	1977
Selma	Orville: Unit 1	1,100,000	Alabama Power Co.	1981
Selma	Orville: Unit 2	1,100,000	Alabama Power Co.	1982
ARKANSAS				
Russellville	Arkansas Nuclear One: Unit 1	820,000	Arkansas Power & Light Co.	1973
Russellville	Arkansas Nuclear One: Unit 2	920,000	Arkansas Power & Light Co.	1976
CALIFORNIA				
Humboldt Bay	Humboldt Bay Power Plant: Unit 3	68,500	Pacific Gas and Electric Co.	1963
San Clemente	San Onofre Nuclear Generating Station: Unit 1	430,000	So. Calif. Ed. & San Diego Gas & El. Co.	1967
San Clemente	San Onofre Nuclear Generating Station: Unit 2	1,140,000	So. Calif. Ed. & San Diego Gas & El. Co.	–
San Clemente	San Onofre Nuclear Generating Station: Unit 3	1,140,000	So. Calif. Ed. & San Diego Gas & El. Co.	–
Diablo Canyon	Diablo Canyon Nuclear Power Plant: Unit 1	1,060,000	Pacific Gas and Electric Co.	1974
Diablo Canyon	Diablo Canyon Nuclear Power Plant: Unit 2	1,060,000	Pacific Gas and Electric Co.	1975
Clay Station	Rancho Seco Nuclear Generating Station	804,000	Sacramento Municipal Utility District	1974
Pt. Arena	Mendocino Power Plant: Unit 1	1,128,000	Pacific Gas & Electric Co.	1978
Pt. Arena	Mendocino Power Plant: Unit 2	1,128,000	Pacific Gas & Electric Co.	1979
*	–	770,000	Southern California Edison Co.	1981
*	–	770,000	Southern California Edison Co.	1982
COLORADO				
Platteville	Ft. St. Vrain Nuclear Generating Station	330,000	Public Service Co. of Colorado	1973
CONNECTICUT				
Haddam Neck	Haddam Neck Plant	575,000	Conn. Yankee Atomic Power Co.	1967
Waterford	Millstone Nuclear Power Station: Unit 1	652,100	Northeast Utilities	1970
Waterford	Millstone Nuclear Power Station: Unit 2	828,000	Northeast Utilities	1974
DELAWARE				
Middletown	Delmarva Unit 1	770,000	Delmarva Power & Light Co.	1978
Middletown	Delmarva Unit 2	770,000	Delmarva Power & Light Co.	1981
FLORIDA				
Turkey Point	Turkey Point Station: Unit 3	693,000	Florida Power & Light Co.	1972
Turkey Point	Turkey Point Station: Unit 4	693,000	Florida Power & Light Co.	1973
Red Level	Crystal River Plant: Unit 3	825,000	Florida Power Corp.	1973
Ft. Pierce	St. Lucie Plant: Unit 1	800,000	Florida Power & Light Co.	1975
Ft. Pierce	St. Lucie Plant: Unit 2	890,000	Florida Power & Light Co.	1979
GEORGIA				
Baxley	Edwin I. Hatch Nuclear Plant: Unit 1	786,000	Georgia Power Co.	1973
Baxley	Edwin I. Hatch Nuclear Plant: Unit 2	786,000	Georgia Power Co.	1976
Waynesboro	Alvin W. Vogtle, Jr. Plant: Unit 1	1,105,000	Georgia Power Co.	1978
Waynesboro	Alvin W. Vogtle, Jr. Plant: Unit 2	1,105,000	Georgia Power Co.	1979
ILLINOIS				
Morris	Dresden Nuclear Power Station: Unit 1	200,000	Commonwealth Edison Co.	1960
Morris	Dresden Nuclear Power Station: Unit 2	800,000	Commonwealth Edison Co.	1970
Morris	Dresden Nuclear Power Station: Unit 3	800,000	Commonwealth Edison Co.	1972
Zion	Zion Nuclear Plant: Unit 1	1,050,000	Commonwealth Edison Co.	1972
Zion	Zion Nuclear Plant: Unit 2	1,050,000	Commonwealth Edison Co.	1973
Cordova	Quad-Cities Station: Unit 1	800,000	Comm. Ed. Co.-Ia.-Ill. Gas & Elec. Co.	1972
Cordova	Quad-Cities Station: Unit 2	800,000	Comm. Ed. Co.-Ia.-Ill. Gas & Elec. Co.	1972
Seneca	LaSalle Co. Nuclear Station: Unit 1	1,078,000	Comm. Ed. Co.-Ia.	1977
Seneca	LaSalle Co. Nuclear Station: Unit 2	1,078,000	Comm. Ed. Co.-Ia.	1978
Byron	Byron Station: Unit 1	1,120,000	Comm. Edison Co.	1979
Byron	Byron Station: Unit 2	1,120,000	Comm. Edison Co.	1980
Braidwood	Braidwood: Unit 1	1,100,000		1980
Braidwood	Braidwood: Unit 2	1,100,000		1981
INDIANA				
Dune Acres	Bailly Generating Station	660,000	Northern Indiana Public Service Co.	1977
IOWA				
Palo	Duane Arnold Energy Center: Unit 1	529,700	Iowa Electric Light and Power Co.	1973
LOUISIANA				
Taft	Waterford Generating Station	1,165,000	Louisiana Power & Light Co.	1976
St. Francisville	River Bend Station	940,000	Gulf States Utilities Co.	1979

Figure 1. Nuclear power reactors in the United States December 31, 1972—continued

SITE	PLANT NAME	CAPACITY (Net Kilowatts)	UTILITY	INITIAL DESIGN POWER
MAINE				
Wiscasset	Maine Yankee Atomic Power Plant	790,000	Maine Yankee Atomic Power Co.	1972
MARYLAND				
Lusby	Calvert Cliffs Nuclear Power Plant: Unit 1	845,000	Baltimore Gas and Electric Co.	1974
Lusby	Calvert Cliffs Nuclear Power Plant: Unit 2	845,000	Baltimore Gas and Electric Co.	1974
Douglas Point	Douglas Point Project: Unit 1	1,100,000	Potomac Electric Power Co.	1980
Douglas Point	Douglas Point Project: Unit 2	1,100,000	Potomac Electric Power Co.	1981
MASSACHUSETTS				
Rowe	Yankee Nuclear Power Station	175,000	Yankee Atomic Electric Co.	1961
Plymouth	Pilgrim Station: Unit 1	655,000	Boston Edison Co.	1972
Plymouth	Pilgrim Station: Unit 2	1,180,000	Boston Edison Co.	1978
MICHIGAN				
Big Rock Point	Big Rock Point Nuclear Plant	70,300	Consumers Power Co.	1963
South Haven	Palisades Nuclear Power Station	700,000	Consumers Power Co.	1971
Lagoona Beach	Enrico Fermi Atomic Power Plant: Unit 2	1,123,000	Detroit Edison Co.	1976
Lagoona Beach	Enrico Fermi Atomic Power Plant: Unit 3	1,124,000	Detroit Edison Co.	1980
Bridgman	Donald C. Cook Plant: Unit 1	1,060,000	Indiana & Michigan Electric Co.	1973
Bridgman	Donald C. Cook Plant: Unit 2	1,060,000	Indiana & Michigan Electric Co.	1974
Midland	Midland Nuclear Power Plant: Unit 1	492,000	Consumers Power Co.	1977
Midland	Midland Nuclear Power Plant: Unit 2	818,000	Consumers Power Co.	1978
St. Clair County	Greenwood: Unit 2	1,240,000	Detroit Edison Co.	1979
St. Clair County	Greenwood: Unit 3	1,240,000	Detroit Edison Co.	1981
Quanicassee	Quanicassee: Unit 1	1,150,000	Consumers Power Co.	1981
Quanicassee	Quanicassee: Unit 2	1,150,000	Consumers Power Co.	1981
MINNESOTA				
Monticello	Monticello Nuclear Generating Plant	545,000	Northern States Power Co.	1971
Red Wing	Prairie Island Nuclear Generating Plant: Unit 1	530,000	Northern States Power Co.	1973
Red Wing	Prairie Island Nuclear Generating Plant: Unit 2	530,000	Northern States Power Co.	1974
MISSISSIPPI				
Port Gibson	Grand Gulf Nuclear Station	1,275,000	Mississippi Power & Light Co.	1978
NEBRASKA				
Fort Calhoun	Ft. Calhoun Station: Unit 1	457,400	Omaha Public Power District	1973
Brownville	Cooper Nuclear Station	778,000	Nebraska Public Power District and Iowa Power and Light Co.	1973
NEW HAMPSHIRE				
Seabrook	–	1,100,000	Public Service of N.H.	1979
Seabrook	–	1,100,000	Public Service of N.H.	1981
NEW JERSEY				
Toms River	Oyster Creek Nuclear Power Plant: Unit 1	640,000	Jersey Central Power & Light Co.	1969
Forked River	Forked River Generating Station: Unit 1	1,070,000	Jersey Central Power & Light Co.	1978
Salem	Salem Nuclear Generating Station: Unit 1	1,090,000	Public Service Electric and Gas, N.J.	1974
Salem	Salem Nuclear Generating Station: Unit 2	1,115,000	Public Service Electric and Gas, N.J.	1975
Bordentown	Newbold Nuclear Generating Station: Unit 1	1,067,000	Public Service Electric and Gas, N.J.	1978
Bordentown	Newbold Nuclear Generating Station: Unit 2	1,067,000	Public Service Electric and Gas, N.J.	1979
Little Egg Inlet	Atlantic Generating Station: Unit 1	1,150,000	Public Service Electric and Gas, N.J.	1980
Little Egg Inlet	Atlantic Generating Station: Unit 2	1,150,000	Public Service Electric and Gas, N.J.	1981
NEW YORK				
Indian Point	Indian Point Station: Unit 1	265,000	Consolidated Edison Co.	1963
Indian Point	Indian Point Station: Unit 2	873,000	Consolidated Edison Co.	1973
Indian Point	Indian Point Station: Unit 3	965,000	Consolidated Edison Co.	1974
Scriba	Nine Mile Point Nuclear Station: Unit 1	625,000	Niagara Mohawk Power Co.	1970
Scriba	Nine Mile Point Nuclear Station: Unit 2	1,080,000	Niagara Mohawk Power Co.	1978
Ontario	R.E.Ginna Nuclear Power Plant: Unit 1	420,000	Rochester Gas & Electric Co.	1970
Brookhaven	Shoreham Nuclear Power Station	819,000	Long Island Lighting Co.	1977
Scriba	James A. Fitzpatrick Nuclear Power Plant	821,000	Power Authority of State of N.Y.	1973
NORTH CAROLINA				
Southport	Brunswick Steam Electric Plant: Unit 1	821,000	Carolina Power and Light Co.	1975
Southport	Brunswick Steam Electric Plant: Unit 2	821,000	Carolina Power and Light Co.	1974
Cowans Ford Dam	Wm. B. McGuire Nuclear Station: Unit 1	1,180,000	Duke Power Co.	1975
Cowans Ford Dam	Wm. B. McGuire Nuclear Station: Unit 2	1,180,000	Duke Power Co.	1977
Bonsal	Shearon Harris Plant: Unit 1	915,000	Carolina Power & Light Co.	1977
Bonsal	Shearon Harris Plant: Unit 2	915,000	Carolina Power & Light Co.	1978
Bonsal	Shearon Harris Plant: Unit 3	915,000	Carolina Power & Light Co.	1979
Bonsal	Shearon Harris Plant: Unit 4	915,000	Carolina Power & Light Co.	1980

Figure 1. Nuclear power reactors in the United States December 31, 1972—continued

SITE	PLANT NAME	CAPACITY (Net Kilowatts)	UTILITY	INITIAL DESIGN POWER
OHIO				
Oak Harbor	Davis-Besse Nuclear Power Station	872,000	Toledo Edison-Cleveland Electric Illuminating Co.	1974
Painesville	Perry Nuclear Power Plant: Unit 1	1,100,000	Cleveland Electric Illuminating Co.	1979
Painesville	Perry Nuclear Power Plant: Unit 2	1,100,000	Cleveland Electric Illuminating Co.	1980
Moscow	Wm. H. Zimmer Nuclear Power Station: Unit 1	810,000	Cincinnati Gas & Electric Co.	1976
OREGON				
Prescott	Trojan Nuclear Plant: Unit 1	1,130,000	Portland General Electric Co.	1975
PENNSYLVANIA				
Peach Bottom	Peach Bottom Atomic Power Station: Unit 1	40,000	Philadelphia Electric Co.	1967
Peach Bottom	Peach Bottom Atomic Power Station: Unit 2	1,065,000	Philadelphia Electric Co.	1973
Peach Bottom	Peach Bottom Atomic Power Station: Unit 3	1,065,000	Philadelphia Electric Co.	1974
Pottstown	Limerick Generating Station: Unit 1	1,065,000	Philadelphia Electric Co.	1978
Pottstown	Limerick Generating Station: Unit 2	1,065,000	Philadelphia Electric Co.	1979
Shippingport	Shippingport Atomic Power Station: Unit 1	90,000	Duquesne Light Co.	1957
Shippingport	Beaver Valley Power Station: Unit 1	852,000	Duquesne Light Co.-Ohio Edison Co.	1974
Shippingport	Beaver Valley Power Station: Unit 2	852,000	Duquesne Light Co.-Ohio Edison Co.	1978
Goldsboro	Three Mile Island Nuclear Station: Unit 1	819,000	Metropolitan Edison Co.	1973
Goldsboro	Three Mile Island Nuclear Station: Unit 2	905,000	Jersey Central Power & Light Co.	1975
Berwick	Susquehanna Steam Electric Station: Unit 1	1,052,000	Pennsylvania Power and Light	1979
Berwick	Susquehanna Steam Electric Station: Unit 2	1,052,000	Pennsylvania Power and Light	1981
*	Philadelphia Electric Co.: HTGR No. 1	1,140,000	Philadelphia Electric Co.	1979
*	Philadelphia Electric Co.: HTGR No. 2	1,140,000	Philadelphia Electric Co.	1981
SOUTH CAROLINA				
Hartsville	H. B. Robinson S.E. Plant: Unit 2	700,000	Carolina Power & Light Co.	1971
Seneca	Oconee Nuclear Station: Unit 1	841,000	Duke Power Co.	1972
Seneca	Oconee Nuclear Station: Unit 2	886,000	Duke Power Co.	1973
Seneca	Oconee Nuclear Station: Unit 3	886,000	Duke Power Co.	1973
Broad River	Virgil C. Summer Nuclear Station: Unit 1	900,000	South Carolina Electric & Gas Co.	1977
Lake Wylie	Catawba Nuclear Station: Unit 1	1,180,000	Duke Power Co.	1979
Lake Wylie	Catawba Nuclear Station: Unit 2	1,180,000	Duke Power Co.	1980
TENNESSEE				
Daisy	Sequoyah Nuclear Power Plant: Unit 1	1,140,000	Tennessee Valley Authority	1974
Daisy	Sequoyah Nuclear Power Plant: Unit 2	1,140,000	Tennessee Valley Authority	1975
Spring City	Watts Bar Nuclear Plant: Unit 1	1,169,000	Tennessee Valley Authority	1977
Spring City	Watts Bar Nuclear Plant: Unit 2	1,169,000	Tennessee Valley Authority	1978
Oak Ridge	Fast Breeder Demonstration Plant	400,000	Tennessee Valley Authority	1980
TEXAS				
Glen Rose	Commanche Peak Steam Electric Station: Unit 1	1,150,000	Texas Power & Light	1980
Glen Rose	Commanche Peak Steam Electric Station: Unit 2	1,150,000	Texas Power & Light	1982
VERMONT				
Vernon	Vermont Yankee Generating Station	513,900	Vermont Yankee Nuclear Power Corp.	1972
VIRGINIA				
Gravel Neck	Surry Power Station: Unit 1	788,000	Virginia Electric & Power Co.	1972
Gravel Neck	Surry Power Station: Unit 2	788,000	Virginia Electric & Power Co.	1973
Mineral	North Anna Power Station: Unit 1	898,000	Virginia Electric & Power Co.	1974
Mineral	North Anna Power Station: Unit 2	898,000	Virginia Electric & Power Co.	1975
Mineral	North Anna Power Station: Unit 3	900,000	Virginia Electric & Power Co.	1977
Mineral	North Anna Power Station: Unit 4	900,000	Virginia Electric & Power Co.	1978
WASHINGTON				
Richland	N-Reactor/WPPSS Steam	800,000	Atomic Energy Commission	1966
Richland	Hanford No. 1	1,120,000	Washington Public Power Supply System	1980
Richland	Hanford No. 2	1,103,000	Washington Public Power Supply System	1977
WISCONSIN				
Genoa	Genoa Nuclear Generating Station	53,200	Dairyland Power Cooperative	1969
Two Creeks	Point Beach Nuclear Plant: Unit 1	497,000	Wisconsin Michigan Power Co.	1971
Two Creeks	Point Beach Nuclear Plant: Unit 2	497,000	Wisconsin Michigan Power Co.	1972
Carlton	Kewaunee Nuclear Power Plant: Unit 1	541,000	Wisconsin Michigan Power Co.	1972
PUERTO RICO				
Puerto De Jobas	Aguirre Nuclear Power Plant	583,000	Puerto Rico Water Resources Authority	1975
*	–	1,175,000	Tennessee Valley Authority	1977
*	–	1,175,000	Tennessee Valley Authority	1978
*	–	1,120,000	Tennessee Valley Authority	1980
*	–	1,120,000	Tennessee Valley Authority	1981
*	–	1,120,000	Tennessee Valley Authority	1981
*	–	1,120,000	Tennessee Valley Authority	1982
*	–	900,000	Virginia Electric & Power Company	1980
*	–	900,000	Virginia Electric & Power Company	1981

* Site not selected.

Figure 1. Nuclear power reactors in the United States December 31, 1972—continued

Reported Nuclear Detonations, February 1973

(Includes seismic signals presumably from foreign nuclear detonations)

Seismic signals, presumably from a Soviet underground nuclear explosion, were recorded by the United States on February 16, 1973. The signals originated shortly after midnight, EST, at the Semipalatinsk nuclear test area and were equivalent to those of an underground nuclear explosion in the yield range of 20-200 kilotons.

There were no reported nuclear detonations for the United States for February 1973.

Not all of the nuclear detonations in the United States are announced immediately, therefore, the information in this section may not be complete. A complete list of announced U.S. nuclear detonations may be obtained upon request from the Division of Public Information, U.S. Atomic Energy Commission, Washington, D.C. 20545.

☆U.S. Government Printing Office: 1973-514-846/8

SYNOPSES

Synopses of reports, incorporating a list of key words, are furnished below in reference card formati for the convenience of readers who may wish to clip them for their files.

RADIOBIOASSAY PROGRAM OF THE INSTITUTIONAL TOTAL DIET SAMPLING NETWORK: I. ANALYTICAL DATA RELATED TO SAMPLES COLLECTED DURING 1966–1968. *A. A. Moghissi, M. W. Carter, and R. Lieberman. Radiation Data and Reports,* Vol. *14,* March 1973, pp. 129–144.

In January 1966, a radiobioassay program was added to the Institutional Total Diet Sampling Network program. The sampling and analysis procedures are described and the data for 1966 through 1968 are presented.

KEYWORDS: body burdens, cesium-137, diet, radiobioassay, strontium-90, urine.

STATE ENVIRONMENTAL RADIOACTIVITY SURVEILLANCE PROGRAMS, 1972. *Mary Ann Culliton, Radiation Data and Reports,* Vol. *14,* March 1973, pp. 145–173.

This report presents a summary of State environmental radioactivity surveillance programs for 1972. Information is given in table form on sample media, sites, collection and analysis frequency, and types of analysis performed.

KEYWORDS: air, environment, milk, nuclear facilities, radionuclides, surveillance programs, United States.

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GUIDE FOR AUTHORS

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Send original and one legible copy of the paper, typed double-spaced on 8½ by 11-inch white bond with 1-inch margins.

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Preparation of manuscripts

The Government Printing Office style manual is used as a general guide in the preparation of all copy for *Radiation Data and Reports*. In addition, *Radiation Data and Reports* has developed a "Guide" regarding manuscript preparation which is available upon request. However, for most instances, past issues of *Radiation Data and Reports* would serve as a suitable guide in preparing manuscripts.

Titles, authors: Titles should be concise and informative enough to facilitate indexing. Names of authors should appear on the third line below the manuscript title. Affiliation of each author should be given by a brief footnote including titles, professional connections at the time of writing, present affiliation if different, and present address.

Abstracts: Manuscripts should include a 100- to 150-word abstract which is a factual (not descriptive) summary of the work. It should clearly and concisely state the purpose of the investigation, methods, results and conclusions. Findings that can be stated clearly and simply should be given rather than to state that results were obtained.

A list of suggested keywords (descriptors) which are appropriate indexing terms should be given following the abstract.

Introductory paragraph: The purpose of the investigation should be stated as early as possible in the introductory paragraph.

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